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Cover photo: *Frank N. Meyer, USDA plant explorer, beside "a heavily loaded branch of the Ta-yuan variety of jujube (Zizyphus sativa)," Shansi, China, August 10, 1914 (Courtesy, Isabel Shipley Cunningham; see her article herein).*

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NOTE: The cumulative indexes for 1979 (which was scheduled to appear in this issue) and for 1980 will be included in the next issue (i.e. volume 6, numbers 1/2, January/June, 1981).

(Illustrations found on pages 77, 101, 102, 104 are from Nicolas Robert's *Variae . . . Florum Species . . .* [1665]; illustrations found on pages 73, 95, 98 are from . . . *Florum, Herbarum, Ac Fructuum Selectiorum Icones, Pleraeq . . .* [1640]. Both volumes courtesy National Agricultural Library, Rare Book Collection).

EDITORIAL NOTICE

Serving as Editors of the *Journal of NAL Associates* for the last six years (1976-1981) has been a challenging, exciting, and intellectually rewarding experience. We wish to extend our thanks and appreciation to the many individuals who not only have contributed to the growth and success of the publication but also have given us their support.

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Donna and Alan Fusonie
Editors

FOREWORD

During the 16th century, herbalists such as Brunfels, Fuchs, Bock, Mattioli, and others viewed plants as sources of medicinal virtues. With the passage of time, man's recorded knowledge concerning the importance of plants to the world environment has undergone a transformation. Today, the National Agricultural Library, with its vast specialized holdings and access capabilities to various data bases, is a major source of information on the vital importance of plants to the world we live in.

Once again, I compliment the editorial staff of the Associates of NAL for developing another pertinent issue.

Richard A. Farley
Acting Director, National
Agricultural Library

AGRICULTURAL PEST CONTROL IN COLONIAL NORTH AMERICA

BY

A. E. SMITH AND D. M. SECOY*

The Europeans, when colonizing other continents during the 17th, 18th, and 19th centuries, took their livestock, crops, and agricultural practices with them. Among these practices were those used for the prevention of crop losses both by disease and by pests. Such pest control measures employed by pre-industrial European farmers included the use of prayer, magic spells, cultivation, mechanical practices, and the application of organic and inorganic substances for the control of plant diseases, the killing of weeds, and the destruction or repelling of insect pests.[1]

In the New World, contact with native agriculture tended to result in the assimilation of crops rather than in the absorption of Indian agricultural techniques. Thus, although the early settlers initially used Indian agricultural practices, such as maize hill planting, European methods were soon used to cultivate both European and native crops. Some crop protection methods seem to have been used by the Indians, although information on this subject is limited. Most insecticidal and insect repellent plants, such as angelica, sweet-grass, mints, tobacco, fleabane, etc., were used by the Indians for control of skin parasites and various types of flies.[2] Maize seed, however, was soaked in a decoction of the acrid and poisonous false hellebore (*Veratrum viride*) by the Mohawk Indians to protect their seed from crows and other birds; while on the Gulf Coast, birds and mammals were kept out of ripening maize by birdscarers who lived in small huts in the corners of the fields.[3] Weeds appear to have been controlled entirely by hand or hoe.

Since many important pre- and post-revolutionary farmers and planters were aware of the major writings in European agriculture,[4] it is not surprising that the pest control procedures used by the 18th and early 19th century farmers and horticulturists were very similar to those described by European sources. These pest control methods common to both continents included seed steeping for protection against disease and insects, the dusting of plants and trees with powders and dusts and the spraying of them with liquids to kill insects, tar-banding of trees for insect control, and stubble burning after cereal harvest to destroy both weeds and their seeds and insect pests. Unique to the New World were attempts at what would now be described as biological control practices against insect pests. Agricultural experimentation under New World conditions did not become prevalent until the second half of the 18th century in company with the founding of American agricultural and scientific societies.[5]

Seed steeping, which in its simplest form consisted of dumping the seed intended for immediate planting into a large tub containing various solutions, was considered important for the removal of the lighter weed seeds from the seed grain, as a protectant against fungal infections, especially the wheat disease bunt (*Tilletia* spp.), and as a fertilizer for the germinating seedlings. Seed steeps of water,[6] brine solutions,[7] limed water,[8] and alkaline washes of wood ashes[9] were used. Before planting, the seed was first steeped in these solutions for several hours. Small weed seeds and light, often diseased or worm-eaten, grains which floated to the surface were skimmed off and discarded. The healthy grain remaining at the bottom of the tub was removed and dried by mixing with gypsum, quicklime, or slaked lime, and sown. Seed steeps had been in general use in Europe from the end of the 16th century,[10] although as preventatives against bunt only steeps containing acid or alkaline substances would be effective, since these retard the germination of the fungal spores adhering to the seed coat. The heat produced by hydration of the lime when mixed with the wet seed can also destroy the germination capacity of most fungal spores.[11] Seed steeps continued in use until more efficient methods for the control of bunt, involving treatment of the seed grain with copper salts, were developed following the pioneering work of Tillet, Tessier, and Prevost in France during the latter part of the 18th century,[12] which did much to elucidate the nature of the smut disease.

Seed treatments were also used in attempts to keep cutworms, wireworms, and other insect pests from attacking cereal and turnip crops. The steeping of turnip seed in fish oil, or the addition of sulphur to the turnip seed, prior to sowing was held to prevent destruction of the germinating seedlings by "turnip flies" (probably *Phyllotreta* spp.).[13] More elaborate seed treatments containing chamber pot lees, copperas (ferrous sulphate), train oil (boiled whale or fish oil), turpentine, sulphur, nitre, bullock's bile, garlic, and bay salt were also advocated.[14] After steeping in this concoction for several hours, the seed was tossed with ashes, soot, lime, rosin, or sulphur, and the coated seed sown.[15] All of these seed treatments had their genesis in British agricultural books and probably resulted in some measure of control, since ingredients such as sulphur, copperas, and salt are effective in destroying some insect larvae.[16]

For maize, a crop of New World origin not commonly grown in Europe at the time, American farmers developed their own steeping solutions to protect the germinating corn from attack by insects, birds, and rodents. At the end of the 18th century, on his Virginia farm, John Binns tested the Mohawk method of steeping grain in a decoction of false hellebore and concluded that it was indeed effective as a deterrent for birds and insects.[17] Hot water in which tar had been dissolved was a favored steep for these purposes, although the addition of train oil to the tar water was commonly practiced.[18] It was also usual to treat the maize with substances such as old animal urine, salt, or nitre at some stage of the steeping process, to act as a fertilizer for the germinating seed.[19] Following steeping, the seed was covered with ashes, lime, or gypsum and sown. These corn seed treatments should have proven moderately effective against insect and vertebrate pests since the toxic nature of false hellebore and the insecticidal properties of tar are well known.

The Hessian fly (*Phytophaga destructor*), a species of European origin became a serious pest of wheat during the Revolutionary War. Against this insect several remedies were tried. Burning the stubble after harvest was considered to be beneficial since it not only destroyed weeds and their seeds but also killed the Hessian fly.[20] Treating the wheat seed before sowing with sulphur, or a mixture of sulphur and rosin, or with an infusion of elder leaves, was also suggested.[21] Several sources recommended that the seed should be immersed in nearly boiling water for a few seconds, in the belief that this would destroy the eggs of the fly on the seed grain.[22] As usual, the wet grain was to be dried with applications of gypsum, quicklime, or slaked lime and sown. None of these treatments, except for stubble burning, would have been effective, since John Bordley had already correctly observed that the Hessian fly deposits its eggs on growing wheat.[23] Although the seed treatments, therefore, would have done nothing to reduce crop damage caused by the Hessian fly, the hot water treatment should have been effective in destroying fungal spores on the grain, and so reduced wheat losses by disease.

The wheat of the American farmers also suffered from the fungus disease called rust (*Puccinia graminis*). In Europe

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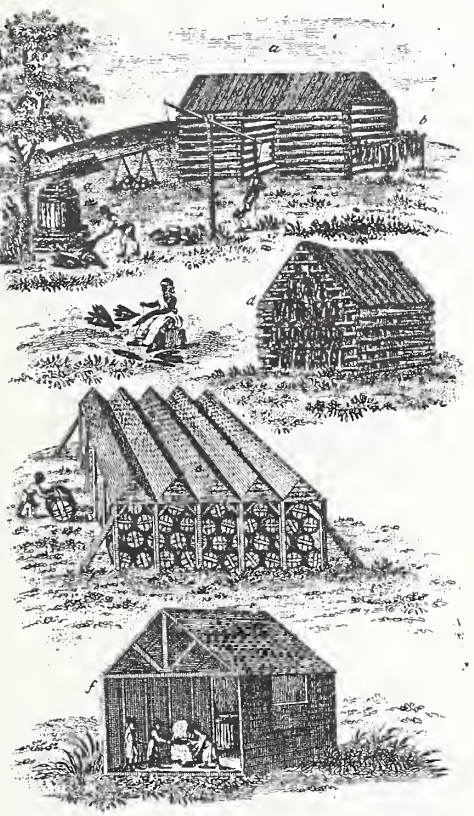
it had long been suspected that this disease was somehow related to the presence of barberry bushes. During 1660, a Barberry Eradication Law had been passed in Rouen and, in 1745, a similar law was enacted in Massachusetts.[24] As a control measure such legislation would have been effective, if enforced, since the barberry is the alternative host for the wheat rust, and infection of the wheat in the vicinity of barberry bushes is a common occurence.[25]

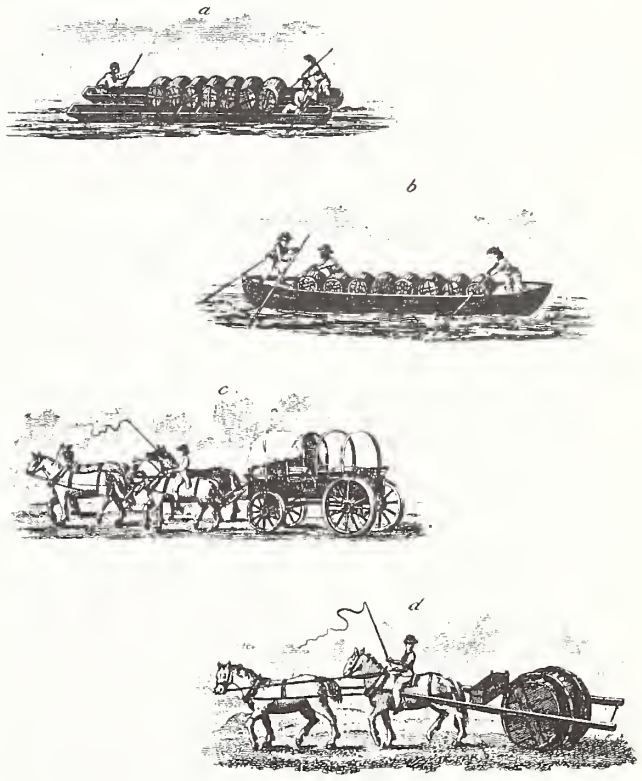
For the control of "worms," aphids, and other insect pests infesting kitchen and flower gardens and orchards, various methods were tried. Wood ashes, coal ashes, lime, salt, soot, or sulphur were cast or dusted over the infested plants, vines, or trees.[26] Solutions of wood ashes, salt, lime, or soap[27] as well as infusions of elder, walnut, and wormwood were sprayed over plants.[28] Fumigations of tar mixed with sulphur were burned to the windward of plants so that the sulphurous fumes would kill the pests infesting them.[29] The belief that metallic mercury poured into a hole drilled in the trunk of a tree would circulate in the sap and thus destroy insect pests on the leaves was also discussed, although those who seem to have tried the treatment were not impressed with the results of this early, but ineffectual, attempt at a systemic poison.[30] Greater success in controlling insect pests was accomplished by treating infested plants and trees with solutions of mercury salts,[31] which are considerably more toxic than elemental mercury, and tobacco.[32] Tobacco seems to have been in general use as an insecticide since the early 1730s.[33] The tobacco was applied as a liquid infusion, snuff, or as a fumigation,[34] the latter being particularly effective in the enclosed spaces of cold frames and greenhouses. Mercury salts are toxic to both insects and fungi responsible for plant damage, while nicotine, contained in tobacco, is still in use to kill many invertebrate and vertebrate animals. All of these materials mentioned were in general use as insecticides in Europe before they were used in North America.[35] Frequent applications of these materials should have given the users a measure of insect control.[36]

Tobacco itself, one of the important crops of the southern colonies, suffered from several insect pests despite its inherent insecticidal nature. Three pests appear to have been troublesome to the tobacco plants during this period--a larva which ate the roots, the tobacco hornworm (*Manduca sexta*) which attacked the leaves, and a "fly" which ate the young seedlings.[37] The former two pests could be laboriously picked by hand and trodden underfoot, a practice which had to be repeated up to ten times during the growing season.[38] Since the hornworm is a favorite food of turkeys, it was common for some planters to release these birds into fields to feed on the large caterpillars.[39] During the late 18th century, Judge Parker observed that sulphur strewn over the tobacco seedlings might kill the infesting fly.[40] He also suggested that a strong solution of sassafras, prepared from the root or bark and sprinkled over the plants might destroy the tobacco fly, since he had successfully used this infusion to kill aphids on cabbages.[41] A measure of protection against the tobacco fly seems to have been attained by sowing lettuce with the tobacco plants, or planting white mustard around the plots, to act as lure crops and thus keep the fly from the tobacco fields.[42]



The Tobacco House:

a) The common Tobacco House
b) Tobacco hanging upon a scaffold
c) The operation of prizing
d) Inside view of a Tobacco House, shewing the tobacco hanging to cure
e) An outside view of public warehouses
f) An inside view of the public warehouse, shewing the process of inspection



Conveyance to Market:

a) Conveying tobacco upon canoes
b) Conveying tobacco by uplant boats
c) Conveying tobacco by waggons
d) Method of rolling tobacco in Virginia

(From William Tatham's An Historical and Practical Essay on the Culture and Commerce of Tobacco, *London, 1800; Courtesy, Rare Book Collection, National Agriculture Library)*

While most agricultural pest control methods originated in Europe and were adopted by New World farmers, to an American may go the distinction of being the first to prepare the fungicidal and insecticidal compound known today as lime sulphur. The forerunner of this preparation was described by the Englishman Forsyth in 1802, who mixed quicklime, sulphur, and boiling water with tobacco and elder flowers to make a solution that was effective against blights and mildews on fruit trees.[43] In 1826, Isaac Chapman in the Eastern United States appears to have mixed lime and sulphur together with water to yield a water-soluble sulphuret, or sulphide.[44] This compound was prepared in a very similar manner to the lime sulphur preparation known as Eau Grison, which was used to control fungus diseases on vines in France after 1852.[45] Instead of using his sulphuret as an insecticide, or for the control of disease, Chapman applied it to his freshly sown maize as a manure. However, he considered that his excellent yields could have been due to the absence of insect pests and disease.[46] Chapman also prepared a sulphuret of barytes (native Barium sulphate), by heating the barium salt together with charcoal.[47] This product, which was in all probability a sulphide of barium, killed insect pests on cucumbers, although care was needed to prevent damage to the tender plants. In both cases, Chapman seems to have been ahead of his time, since the sulphides of calcium and barium are now known to have fungicidal and insecticidal properties.[48] There is no evidence that these compounds of Chapman's were ever extensively used in North America during the early part of the 19th century.

A variety of remedies were adopted to protect the fruit trees from their many pests and diseases. In 1672, Josselyn wrote that the fruit trees of the New World suffered mainly from two diseases--the "Meazles," when they were scorched by the sun, and "Louziness," when woodpeckers drilled holes in their trunks to feed on bark beetles.[49] As a preventative against these insects, the American horticulturists drilled holes into the main root with an auger, filled the holes with brandy or rum, and sealed them with wooden pins.[50] This remedy, very similar to one described in an early 17th century English work,[51] cannot have been in the least effective except in the immediate area of application.

Wounds on trees, resulting from accidents or pruning, were carefully cleaned and covered with tar, with a mixture of tar and fish oil, or with a medicated tar prepared from corrosive sublimate (mercuric chloride) and tar to prevent infestation by insects or fungi.[52] Such practices today are considered sound.

To kill not only insect pests on the trunks and branches of fruit trees but also their eggs laid in the crevices of the bark, washes were applied to the trees in the late fall or early spring, when they were leafless, after all loose bark had been removed. Although boiling water was effective as a wash,[53] tree washes were almost invariably based on lime mixed with water to the consistency of paint.[54] Often ingredients such as ashes, fish oil, linseed oil, mercury salts, salt, soap, sulphur, tobacco, and turpentine were added to the washes for increased effect.[55] These treatments should have been moderately effective since lime washes were used by orchardists in both Europe and America until the early 20th century when more effective chemical treatments were developed.

Two very serious pests of the orchards were the plum curculio (*Conotrachelus nenuphar*) and cankerworms (*Paleacrita vernata* and *Alsophila pometaria*). The former was a particular pest of the plum but also attacked other fruits. Tilton, in the early 1880s, described how the adult female lays her eggs inside the developing fruit during the spring where they hatch into caterpillars and feed on the fruit pulp.[56] The infested fruits fall to the ground and the larvae leave the fruit to enter the soil and pupate over the winter. In the following spring the adult insects emerge to repeat the cycle. The chief remedy against the curculio seems to have been to allow poultry and hogs into the orchards to eat the larvae-infested fruit on the ground, although boards soaked in camphor or turpentine were sometimes suspended from the tree branches to repel the females and so prevent them from laying their eggs.[57] An ingenious and effective solution, based on observations of the insect's life-cycle, was to pave under the trees, or to apply a thick layer of ashes or lime to the diameter of the tree branches so that the larvae could not burrow into the soil to pupate.[58] Tilton also considered that constant jarring of the trees would keep them free from infestation.[59]

The second serious pest of orchard trees, the cankerworms, are specific to apple trees. It was well known that the wingless females emerged from the ground in the late fall or early spring to ascend the tree trunks and lay their eggs.[60] In spring the eggs hatched into small caterpillars which then fed on the foliage. The main protection against this pest was to prevent the female from ascending the trees to deposit her eggs by applying bands of tar, grease, birdlime, or mercurial salts round the trunks.[61] Yet, despite these seemingly sound practical measures, the curculio and cankerworms appear to have been a constant pest for the 18th and early 19th century American orchardists. This could indicate that either very few growers were adopting these remedies or that the measures were not terribly effective in controlling these pests.

Against insect pests in general, many sources encouraged the use of birds as a means of control.[62] American agriculturists seem to have been in advance of their European counterparts in attempts at biological control of insect pests. With increasing knowledge of insect life-cycles and ecology, naturalists became accustomed to destroying insects by means of their natural enemies.[63] Attempts appear to have been made to kill the white-pine weevil and the peach moth larva by the use of parasitic wasps.[64]

In summary, although the early American farmers and horticulturists relied heavily on European sources for their pest control procedures, they did show independence and ingenuity in the control of pests and diseases afflicting their crops and orchards.

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("Skil and Pains, bring fruitful gains," Frontispiece from William Lawson's A New Orchard & Garden: The best way for Planting, Graffing, and to make any Ground good for a Rich Orchard . . ., *London, 1676; Courtesy, Rare Book Collection, National Agricultural Library)*

PLANT PATHOLOGY: CONTRIBUTIONS IN IMPROVING THE AMERICAN FOOD SUPPLY

BY

JOHN MAAS*

Another appropriate title for this article might read "Plant Pathology: What Is It and What Has It Done for Us?" Not altogether surprising is that a great majority of people have very little or no conception of what plant pathologists are, or what they do, aside from the occasional "plant doctor" that they might hear on early morning radio. An examination of what constitutes a plant pathologist and the factors involved in the development of Plant Pathology in the United States may give an insight as to how the plant pathologist has contributed to improving the American food supply, rather than a recitation of statistical estimates concerning loss and production.

Historically, a plant pathologist is one whose work involves the symptoms, causal agents, development, and treatment of diseases and plant abnormalities. These diseases may be caused by viruses, bacteria, mycoplasma, fungi, nematodes, insects, parasitic plants, nutrient deficiencies or excesses, drought, weather conditions, and other biotic or abiotic agents, or any combination of two or more of these factors. Control of plant diseases involves changing horticultural practices, the use of chemicals to protect plants, and using plant material free of disease or genetically resistant to specific diseases. At once, a plant pathologist becomes a virologist, bacteriologist, microbiologist, mycologist, nematologist, entomologist, nutrition and/or soils expert, epidemiologist, horticulturist, chemist, physiologist, or plant breeder. Plant pathologists may become highly specialized, limiting their attention to a specific group of diseases related by a common group of pathogens or by crop specialty. However, general practitioners, the backbone of crop protection and on the front lines of defense, serve as county and state extension agents, private consultants, chemical company representatives, and plant inspectors for state and federal quarantine services.

The goal of plant pathologists is to keep plants in good productive health. That goal is important because healthy and productive plants not only are essential but also are basic to life--food, fiber, energy, environment, and general well-being. To keep plants of all kinds healthy and productive is a never-ending battle with an ever-expanding horizon of changing cultivars, diseases, control and management systems, and social and environmental pressures.

An historical perspective of the development of plant pathology in America is appropriate here:

> Some English seed they sew, as wheat & pease, but it came not to good, eather by the badness of the seed, or latenes of the season, or both, or some other defecte.

Thus expressed by Governor William Bradford in his manuscript originally entitled "Of Plimouth Plantation" (later editions were entitled *History of Plymouth Plantation*) for the month of April, 1621, as one of the most threatening difficulties confronting the Pilgrim colonists as they faced their first spring in a seemingly inhospitable New World. Their numbers already had been reduced by famine while their homeland crops, to which they had looked hopefully for relief, had failed them. Here, early in the history of agriculture of the nation's embryo, was a need for a plant pathologist. This is also the first indication that diseases may have crossed the Atlantic along with their host plants.

Early importation of seed and plant propagation material and their diseases was but a small indication of the later wholesale importation of plant material from all parts of the world for evaluation as possible agricultural commodities in the United States during the eighteenth and nineteenth centuries. Contributing to this catastrophe were such well-meaning notables as George Washington, Benjamin Franklin, and Thomas Jefferson. The House of Representatives, in 1830, requested the President to procure "varieties of sugar cane and such other plants as may best be adapted to the soil and climate of the United States." This was only a part of an uncontrolled flood of plant material from the vast foreign trade of a rapidly developing country which brought over the years a great array of plant diseases that were to affect the future of agriculture in the United States.

The Washingtons, Franklins, and Jeffersons provided a valuable stimulus to agriculture but it should not be to their disgrace that a destructive hoard of diseases accompanied their plant introductions. It should be realized that plant diseases, or maladies, were believed at the time to be caused by drought, wet weather, fog, putrefaction, and other unpropitious factors of nature and one could do little to combat them. Molds, when present, were not considered as the cause but as the result of the malady (Fabricius, 1774). Not until the microscope became a tool to examine the unseen worlds of the plant and animal kingdoms did the realization become apparent that fungi were living entities and could reproduce themselves by even smaller "seeds." Thus the avenues of investigation were available in the late 1700s and early 1800s but, generally, were blocked by those traditionalists who stifled such revolutionary thinking. A few gifted amateurs in Europe (Tillet, 1775; Prevost, 1807; Berkeley, 1846) did show the causal relationship of fungi with plant disease and they also experimented with practical control methods. In America, however, these investigations either were not considered to be of practical application under American conditions or they were totally ignored. Also, there were no agricultural colleges, agricultural experiment stations were new and fragile undertakings, and there existed little or no thought of attacking such a vague conception of plant disease, especially one which conflicted with what every farmer believed.

The scene of American agriculture was to change, however, driven partly by an increasingly urbanized and industrial society which had a direct effect in the areas of food production, protection, and disease control; each of these areas, in turn, demanded specialists in diagnosing and treating plant diseases. Although plant disease problems developed steadily in America through more than two and one-half centuries before 1870, these problems had been relatively non-critical. This is in contrast to the situation in Europe where limited accomplishments had been made in disease prevention and control. Early agriculture in America was carried on in relatively small clearings surrounded by forests. Each settler tended to produce his own seed and the crops themselves were, for the most part, consumed locally. This isolation was a definite deterrent to the spread of disease. When crop production became unprofitable or unpracticable because of soil exhaustion, erosion, plant diseases, pests, or other cultural difficulties, the remedy was to move. The settler moved westward,

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opened another area in the forest, and began again. Plant diseases, if recognized at all, were only one of the calculated risks to be accepted as unpleasant manifestations of an unpredictable Providence.

An end to this system came as a rapidly expanding population spread west to the open Ohio and Mississippi valleys. Here, large continuous farms became the rule. During this same period the development of farm machinery gave impetus to continuous plantings. These developments were sound and helped build a great country but they proved equally effective in making possible a rapid and serious spread of plant diseases and pests. Responding to changing agricultural technologies and food demands of an industrializing society, state and federal governments began serious efforts to increase and protect America's food supply.

The Morrill Land-Grant Act was passed in 1862 and the United States Department of Agriculture was established the same year, although no definitive plant disease work was done until 1877 when Burrill of Illinois established that bacteria could cause serious plant diseases (fire-blight of pome fruits). Slowly, interest in plant pathology increased. In 1884, the American Association for the Advancement of Science appointed a committee for the "encouragement of researches on the health and disease of plants." Their efforts urging that plant disease studies be included in the USDA office of the botanist were successful with the appointment of F. Lamson-Scribner in 1885 as the head, as well as the entire technical staff, of the Section of Mycology of the Division of Botany. In effect, he was the first federal plant pathologist.

During the formative period for Plant Pathology, between 1862 and 1900, the Congress passed a series of acts that profoundly affected the development of scientific agriculture. In March, 1887, the Hatch Act authorized support of an agricultural experiment station in association with the land-grant college of each state. The experiment station work was later strengthened by passage of the Adams, Purnell, and other acts. These acts made a unique provision for agricultural education and research. Plant pathology teaching and research were finally able to develop into a science directly benefitting the farmer and the nation. As a science, plant pathology is about 100 years old. Tracing its roots to amateur botanists, it has gradually coalesced into specialized groups, each with a core of common purpose.

To recount specific examples of the beneficial work and results provided by plant pathologists over the last 100 years would take a few thousand pages. Every plant crop and product, from seed to fruit, vegetable, or fiber, from the field, orchard or forest to the market and ultimately to the consumer, has been helped along the way in some manner by plant pathologists. Pathologists have developed preventative, protective, or eradicative techniques for diseases of many important crops which would otherwise be uneconomical or impossible to grow. Often this has been a one-man, one-crop or disease effort; however, in a majority of situations, it has been a program of cooperation among pathologists, breeders, chemical industries, growers, and many other disciplines. Without these cooperative efforts, America would not be able to produce enough to feed, clothe, and shelter its burgeoning non-agricultural population from an ever decreasing agricultural acreage and still have agricultural products for export to less productive nations and third world countries. Statistics show that American agricultural productivity is increasing which can be attributed directly to a greater efficiency, a higher genetic productivity, and better disease and pest control. Future growth, however, may depend in part on a changing emphasis in plant disease and pest control.

Emphasis in plant disease control in recent years has gradually changed from basically a protective (chemical) control system to an integrated pest management system. Legislative and environmental pressures have necessitated a gradual transition in priorities, from purely chemical control to a combination of control methods. These include selection of crop varieties that are increasingly more resistant to diseases, promoting natural enemies of pathogens, changing horticultural and nutritional practices, and more efficient use of chemical control methods based on pest monitoring and forecasting systems.

The complexity of disease control has concomitantly increased with each advance in agricultural technology and with each change in economics and societal demands. For example, the rapid transport of commodities, transcontinental and international, has hastened the establishment of new diseases in areas previously free of them. Changes of attitude toward use and safety of pesticides have been mentioned above. The complexities of cropping systems in the United States add another dimension. The small diversified farm has largely been replaced by large monoculture farms with increased emphasis on labor reduction through mechanization and reliance on fertilizers and pesticides to maximize yields and profits. Superimposed on this is the somewhat superficial attitude of those who market the goods, as well as the consumer, that any product that is not large, colorful, without blemish, or highly productive is not only inferior but also unacceptable. This has led to an increased use of chemicals (fertilizers, pesticides, and growth-promoting substances) in culture and storage. An increasing concern for high levels of genetic resistance, coupled with good horticultural characteristics, has involved plant pathologists who cooperate with plant breeders in assessing resistance to specific disease problems.

In conclusion, plant pathologists have played an important role in American agriculture for approximately 100 years. Plant pathologists have an indispensable interaction with small and large farmers, the consumer, agricultural and chemical companies, state extension services, and research workers that has contributed to making American agriculture the best in the world.

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Two harvesting scenes in early America (Courtesy of the author)

RESEARCH REVEALS NEW INFORMATION ABOUT FRANK N. MEYER, AGRICULTURAL EXPLORER IN ASIA

BY

ISABEL SHIPLEY CUNNINGHAM*

I. INTRODUCTION

For 10 years Frank Meyer[1] traveled across the continent of Asia for the U.S. Department of Agriculture, fulfilling his promise to "skim the earth in search of things good for man." No hardship or danger deterred him when he was on the trail of a promising fruit, nut, or grain. He walked thousands of miles across lofty mountains and parched deserts, through snow storms and dust storms, and into primeval forests never before seen by a white man. Whether he was wading across swift and icy rivers, balancing a donkey on a fragile bamboo bridge, or following a narrow crumbling footpath along a steep precipice, he had a single goal--to find products useful to mankind. He faced bands of brigands in China, crossed the shifting glacier that formed the Mussart Pass in Chinese Turkestan, endured Siberian winters, and visited Kirghiz settlements where only a generation earlier men had been offered as human sacrifices. He fought off an attack by three murderous ruffians in Siberia and barely escaped being shot by soldiers in the interior of China. Deserted by his interpreter near the border of Tibet and in Samarkand, he doggedly continued his search for useful plants with only a map and a compass as guides.

"At Shansi side of the Yellow River. Our carts being pushed onto the boat that will take us across," August 15, 1914. (Photo by Frank N. Meyer; courtesy of the author).

NOTE: The five photographs relating to this article were taken in Asia by Frank N. Meyer; they are published here for the first time. The descriptive captions are taken directly from Meyer's notations.

Meyer entered China in 1905, near the dawn of the single era when plant hunters could travel freely there. He alone concentrated on useful rather than ornamental plants. Not many years after his death, the borders of China were closed. No other man before him traveled for 10 years through the farms, orchards, and forests of Asia in search of food crops; no one has done so since. British authors have said that his name should be a household word in America and that American farmers should celebrate an annual Meyer festival in grateful remembrance of his work in Asia. Yet, since his death in China in 1918, most Americans outside the Department of Agriculture have forgotten this remarkable man.

You may wonder how I became interested in Frank Meyer. Two years ago I consulted Dr. John L. Creech, then Head of the U.S. National Arboretum, about a talk that I was giving to garden clubs on plant exploration. I said that I was interested only in plant hunters who introduced ornamentals, not in agricultural exploration. Dr. Creech did not comment on my belief that agricultural exploration must necessarily be dull but he suggested that I go to the National Archives and to the National Agricultural Library and read about Frank Meyer. After investigating these sources, I found myself committed to learning more about this little-known and often misunderstood man.

"On the dreaded Mussart or Ice Pass across Tien Shan, Chinese Turkestan. Our caravan climbing over a very rough part of the glacier. Yawning crevices on all sides and stones rolling down at intervals. Altitude 10,500 feet," March 8, 1911. (Photo by Frank N. Meyer; courtesy of the author).

II. SOURCES

At first I did not realize that the 2,500 typed pages of Meyer's letters at the Archives and the articles by and about Frank Meyer at the National Agricultural Library did not exhaust the available sources of information. I next discovered at the Archives 15 large document boxes containing Meyer's original letters, letters to Meyer, accounts, itineraries, clippings, maps, and photographs. In addition, I eventually obtained copies of his application for naturalization, his will, and the administration of his estate. At the National Arboretum I found about a thousand of Meyer's 1,740 official photographs and many of his glass plate negatives. Putting all these bits and pieces together into a coherent narrative is much like making a gigantic jig-saw puzzle. Soon, too, I realized that some of the pieces were missing.

Little has been known about the 25 years when Frank Meyer

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was Frans Meijer of Amsterdam. At the Archives, I encountered a reference to a Dutch periodical that had published an account of Meyer's life and work a year after his death. I did not know the title or the author of the article but I wrote two letters of inquiry to Holland and waited. After a period of about six months, I received from a library in The Hague a photocopy of a 107-page article. It was, of course, in Dutch. I could see pictures of Meyer as a youth and could read proper names and dates but the text tantalized and frustrated me until I found a Dutch translator through the Red Cross language bank. After several months had passed, she completed a translation of this article into English for the first time. Later, I received a second article from the librarian at the Hugo De Vries Plant Laboratory in Amsterdam. She also sent me photocopies of letters that Meyer had written to Hugo De Vries.

Dutch authors had access to Frans Meijer's family, friends, and teachers and, therefore, disclosed facts that are new to Americans. I learned that Frans had always loved plants and animals. Instead of rolling his hoop with other boys after school, he often preferred long walks, reading about faraway places, and working in his family's little garden. When he finished elementary school, he knew that he wanted to be a world traveler who studied plants. Only well-to-do Dutch boys, however, continued their education in the 1880's. When he was 14, Frans found work as a gardener's helper at the Amsterdam Botanical Garden. During his eight years there, the eminent Dutch botanist, De Vries, observed that "something could be made of Frans." As Meyer progressed to gardener and then to head gardener in charge of De Vries's experimental garden, De Vries personally taught him English and French, allowed Frans to attend his lectures, and paid his board and tuition for a semester at the University of Groningen.

But faraway places continued to beckon and Meyer's desire to see the world became too strong to resist. On his twenty-third birthday he began six years of wandering--first across Europe with a map and compass, then to England for a year, then on to Washington and California, across Mexico to Cuba and, eventually, to the Missouri Botanical Garden at St. Louis. In 1905, David Fairchild,[2] head of the Plant Introduction Section of the U.S. Department of Agriculture, summoned Meyer to Washington, met him for the first time, and three weeks later sent him alone to China.

The most important sources of information about Meyer are the letters that he wrote as he traveled--hundreds of them--official and unofficial, Dutch and American. They shed new light both on his attitude toward his experiences and on his character. First, I shall cite some examples to show how his letters reveal his feelings about his work as an agricultural explorer. After a night on a brick bed in a smoky room in a filthy Chinese inn where he battled centipedes, scorpions, lice, and bedbugs, he admitted that he sometimes felt discouraged. But,

> When the sun comes out and I see the beautiful bluish mountains in the distance, I feel it isn't so bad after all. . . . There goes nothing above fresh air, a blue sky above one's head, some mountains in the distance, and a rippling brook or foaming sea close by. . . . I love better exploring than anything else.

A few years later he wrote from Outer Mongolia,

> It really is a noble work we are doing, Mr. Fairchild--You in an office directing things, I out in the wilds, others in propagating gardens, some keeping records; it is all good work. And the results farther reaching perhaps than we ourselves now realize. Who knows what marvels may be found among our introductions?

A recurring theme in Meyer's letters is his love for his adopted country, reflected in his desire "to enrich the United States of America with things good for her households and her people." On the walls of his room in Peking, he hung pictures from American magazines "to keep in my memory green the best country on earth."

His letters also reveal his response to the beauty of nature. Observing autumn tones of scarlet oaks and flaming maples in the Ming Tombs Valley, he said, "To see the sunlight play on these colors is like listening to the most inspiring music. I felt good and was at peace with the whole creation sitting under such a tree."

An entirely new aspect of Meyer that emerges from his Dutch letters is his deep devotion to his family. During the eight years after he left Amsterdam, he often wrote that he was longing to see all of them, especially his "dear mother." When he began his second expedition, his itinerary took him to Antwerp. There he acted as host to his entire family for four days. The group included his parents, brother, two sisters, brother-in-law, and his beloved niece. "We are a crowd of eight people," he wrote David Fairchild. "I am, of course, the most popular member and they want me to talk for hours and hours about all my experiences." Four days together were not enough. When Meyer left for Brussels, he took the whole group with him for three more days.

His work, his adopted country, and his friends elicited Meyer's love and loyalty but there were some things that he did not like. Worst of all, perhaps, was his constant battle against his terrible loneliness. During his first expedition, he asked Fairchild "to put a little less officialness and a little more warmth" in his letters, "for I am all alone here and am not much in conversation with my fellowman." As the years passed, his longing for companionship in the field became more acute. During his fourth expedition, he admitted to Dorsett,[3] "There are times that my loneliness may destroy me."

His correspondence clearly indicates that he also disliked working indoors. He preferred walking 40 miles to two or three hours of sedentary work. During 1908, he spent weeks writing what Fairchild called his "epoch-making" 64-page bulletin, "Agricultural Exploration in the Fruit and Nut Orchards of China." Later he commented, "I still shiver when

"When we left Siku in search of wild almonds and Potanin's peaches we had to cross this rickety bridge, an undertaking which, in windy weather, is decidedly risky, to say the least," Southern Kansu, near Tibet, October, 1914. (Photo by Frank N. Meyer; courtesy of the author).

I think of my forced captivity in sultry Washington. Here I have a feeling I am of greater use to my fellowman than when sitting at a desk in a sweat-box of an office." Yet, in 1915, he labored again to produce the *Yearbook of Agriculture* article, "China, a Fruitful Field for Agricultural Exploration."

War heads the list of things that Meyer abhored. When news

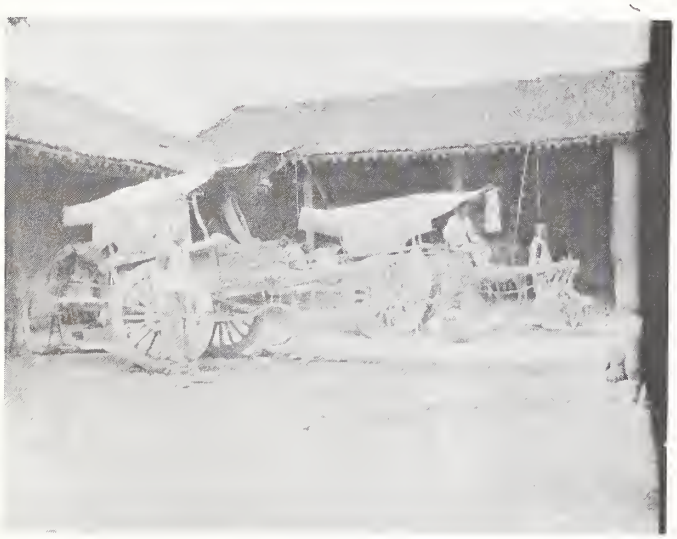
of the beginning of World War I reached him in the interior of China, his letters disclose his grief: "Has hell broken loose on earth? There seems to reign darkness over the Earth now and this after nearly twenty centuries of Christian teaching." He believed in settling all international disputes by arbitration. Far ahead of his time, he advocated a congress of nations that he sometimes called the United Nations of the World. When America joined the combatants, he despaired. "Do all these young lives have to be sacrificed? We too will get our lists of wounded and killed regularly."

Though he sometimes felt depressed by loneliness and later by the war, at other times his letters reveal that his humor and enthusiasm kept his spirits high. Consider his first experience at a rural Chinese bathhouse where the natives had never before seen a white man. When he finished bathing, he found that a crowd had gathered to watch the foreigner dress. "I had to dry and dress in great show just to let them see how we do," he wrote A.J. Pieters.[4] "Happily no buttons came off, so I hope I left a good impression. I often wish you could be here with me. We could laugh many a time."

Sometimes Meyer's letters record his ingenuity in rescuing himself from harm. In the native section of Hankow at night, he once found himself surrounded by a hostile crowd of jeering natives. When he turned toward the foreign quarter, "they jumped me with their fists in the back and put up a terrible howl." Knowing that he would be beaten--or worse --if he became angry, "I did as if I took this howling for an ovation and took my hat off and bowed in all directions and smiled like a president on his inauguration trip. At the same time, I took the greatest haste in marching on and didn't stop until I reached the foreign quarter."

Sometimes his sense of the ridiculous and his keen observations relieved what otherwise might have seemed intolerable situations. After walking hundreds of miles across the bandit-infested mountains of the interior of China, he was glad to reach a town that boasted a choice of inns:

> Imagine an over-crowded inn, with merchants and coolies shouting and having angry disputes; with partitions between the rooms so thin as to make them almost transparent; with people gambling with dice and cards all night long, others smoking opium; hawkers coming in, selling all possilbe sorts of things from raw carrots to straw braid hats; and odors hanging about to make angels procure handkerchiefs. Here you have a picture of the best inn in town.



"Our carts in the courtyard of the inn where we stopped," Shansi, China, August 10, 1914. (Photo by Frank N. Meyer; courtesy of the author).

Meyer's letters not only offer new insights; they also make it possible to clarify concepts that have been only partially understood. His attitude toward collecting herbarium material offers a good illustration. When Meyer began his work, Fairchild told him that the Department of Agriculture had little interest in herbarium specimens. When Charles Sprague Sargent (distinguished director of the Arnold Arboretum in Jamaica Plain, Mass.), however, criticized Meyer severely for his failure to collect herbarium material on his first expedition, Meyer himself realized that he had indeed neglected this area. As he expressed it, "I could have been so much more useful to mankind." As a result of Sargent's criticism, on his three remaining expeditions, Meyer collected herbarium specimens continually. When his collection of hundreds of rare specimens from the interior of China was destroyed by a cyclone and flood at Galveston, he felt devastated.

Another aspect of Meyer's work that has not been appreciated is that he was far ahead of the Department generally in collecting, not for direct introduction, but for the latent possibilities hidden in remote ancestors of our fruits and grains. In the 1920s, the USDA shifted emphasis from direct introduction to hybridization and selection but, as early as 1908, Meyer was looking for "the rudimentary and long-forgotten parent stock or the as yet unused wild plant that may be adapted to man's profit by cultivation." Though Meyer probably never heard the terms "gene pool" or "germ plasm," he showed that he grasped these concepts when he said,

> In the future we will create unheard-of strains of fruits and shrubs and trees and flowering plants. All we need now is to build up collections so as to have the material at hand. . . . We are only cutting out a few steps in the mountain of knowledge and others have to mount by our steps.

I believe that he would not have been surprised by the development of the Bradford pear or the Nemaguard peach or the Emerald crownvetch from his introductions. He expected wonders to emerge.

Turning from the letters, it becomes vital to analyze secondary sources for reliability because some writers have taken more than poetic license in describing Frank Meyer. He himself deplored most newspaper accounts of his expeditions because they emphasized his adventures--real or imaginery--instead of his introductions. "Our work is interesting enough to be reported as it is," he insisted. For example, writers said that he had been in Alaska instead of Siberia and identified his picture as that of David Fairchild. Meyer called these stories "absurd" and "full of nonsense" because they emphasized the sensational at the expense of accuracy.

Though newspapermen may have been the first to spread apocryphal stories about Meyer, others followed their example. When Meyer walked across northern Korea, the Consul-General at Seoul related that Mr. Meyer was attacked by a man-eating tiger and had to escape by sliding down a mountainside. He added that Meyer wired, "Attacked by a tiger. Send me some trousers." Meyer declared that the Consul must have imagined this story in order to relieve the tedium of a consulship in Korea.

Even the oral recollections of a distinguished member of the Department contain a number of errors. He stated, for example, that Meyer walked across Siberia because the Trans-Siberian Railway did not exist at that time, but Meyer's accounts and letters clearly show that he purchased his usual second-class accomodations on the Trans-Siberian Railroad. Worst of all, this departmental member said Meyer's last letter showed that his mind was failing. Fairchild called this same lengthy letter "a masterly analysis of dry-land agriculture . . . so characteristic of Meyer." As a researcher, I have learned to beware of sensational journalists and of recollections recorded many years after the events.

An often-quoted line from another distinguished member of the Department also appears to be less than accurate. He said that Meyer was "in politics, a socialist, and in religion, a Buddhist." Fairchild, however, wrote succinctly, "Meyer was not a socialist." A long letter from Meyer to De Vries explains precisely the extent of his belief in a Utopian sort of socialism distantly related to post-World War I Marxism. As to Meyer's religion, nowhere in over 2,500 pages of letters does he suggest that he was a Buddhist. He identified himself as Protestant but the question of his religious beliefs is too complex to explore at this time.

The most damaging source of inaccurate information about Meyer is the account written by the British plant explorer, Reginald Farrer, when the two men met accidently in the remote town of Siku near what was then the border of Tibet. Farrer resented Meyer's presence there; he said so. Farrer also wrote that Meyer had made no attempt to learn the Chinese language, that he had no interest in the Chinese or their culture, that he habitually had difficulty with his employees, and that he had so antagonized the natives of Siku that only Farrer's intervention made Meyer's safe departure possible. All these charges can be refuted. Meyer's itinerary shows, for example, that he continued to use Siku as a base for several weeks after Farrer had left. Unfortunately, in recent years, British authors of two fine books entitled *The Plant Hunters* have repeated Farrer's version of the events at Siku. British authors should not be blamed for depending on this account since little else has been available. Meyer's explanation has remained hidden in his itinerary report at the National Archives for many years.

III. SOURCES YIELD APPRECIATION OF MEYER'S CHARACTER

In studying all the available sources of information about Frank Meyer, I have learned about the plants he collected, the places he visited, the hardships he faced, and the people he met. As a result, not only has there emerged a more complete portrait of this remarkable man but also I now find myself objecting to what appear to be misinterpretations of his character and personality. It is true that he was somewhat eccentric, especially in his unconventional dress, but surely he should not be remembered chiefly for that reason. Friends at the Amsterdam Botanical Garden recalled that he usually wore an old sweater and that the knees of his pants often were soiled because he had knelt to examine insects or plants. In Edwardian Washington where gentlemen wore hats, white shirts, stiff collars, and suits in July and August, Meyer simply wore a striped shirt and pants. He paid the usual price for being different. I have been asked whether it is true that he arrived in Washington in his bare feet. He did not. He was not crude or rustic. He did swim in the Potomac but he also attended concerts and lectures and visited museums wherever he lived.

A recent article on plant exploration described Meyer as morose, taciturn, and ill at ease with people. Though he was lonely and unhappy at times, he was considered, by men who knew him best, an articulate and fascinating conversationalist who enjoyed the companionship of congenial people. Peter Bisset[5] called him "a robust and vivid personality;" C. G. Pfeiffer[6] said that his death was incredible because he was "so full of life and activity and the spirit of adventure." E. H. Wilson[7] remembered his energy and enthusiasm as his dominant characteristics. At the Fourth of July celebration in Hankow less than a year before Meyer's death, George Mitchell[8] recalled that "Mr. Meyer, with his characteristic enthusiasm, joined in the singing of all the patriotic songs to such an extent that he was hoarse the next day." Perhaps Meyer was morose at times, but taciturn and ill at ease with people? Never!

Instead of remembering him for his eccentricities, let us consider what men who were qualified to judge said about Frank Meyer. Dr. Erwin F. Smith, the Department's distinguished pathologist who found him his first job in America in the old USDA greenhouses on the Mall, described Meyer as a just and upright man, an entertaining public speaker, a good conversationalist, a gifted linguist, and a fascinating correspondent. Fairchild remembered him especially for his kindness, generosity, enthusiasm, and his phenomenal memory for plants. "From the first time I met him, I believed in him," he said. Liberty Hyde Bailey, famous botanist, author, editor, and teacher, visited Meyer twice during his last year in China. After his death, Bailey wrote,

> I shall never cease to regret his untimely end; and I am more than ever glad that I had the two opportunities to be with him last summer, not only because I liked him personally, but also because he gave me so very many interesting points of view and so much information about China. . . . He was worthy of anything we can do to perpetuate his memory.

Meyer must have combined integrity, intelligence, and personal magnetism; only such a person could have attracted the host of people who became his life-long friends, often after only a short acquaintance.

Since writers generally agree in their assessment of the value of Meyer's work, why are there such varied accounts of his personality? One answer is that much information about Meyer has remained unpublished. Another is that his complex character combined qualities that at first appear difficult to reconcile. His kindness, gentleness, and sensitivity contrast with his physical courage, strength, and stamina; his tendency to dream and his love of beauty in art and nature do not seem appropriate to a man who was also practical and realistic; his enthusiasm and love of adventure are not the qualities one expects in a man who was often lonely and sometimes depressed. A British author who praised Meyer's "incredible" journeys also called him "excessively bad-tempered;" yet Erwin Smith[9] described him as "one of the most friendly men I have ever known." He loved old Chinese gardens, beautiful porcelains, and dreaming of faraway places but he also demonstrated amazing physical toughness, great courage, and absolutely inflexible principles. These apparent contradictions make it difficult to understand Meyer until all the pieces of the jig-saw are in place.

IV. CONCLUSION

For 60 years, Meyer's pioneering work in Asia has remained a neglected segment of America's heritage. People generally have forgotten his drought-resistant shade trees, his hardy yellow rose, blight-resistant pears, and his peaches, persimmons, grains, and fodder plants. Six decades after his death, however, it is possible to retrieve information about Meyer and his work. His family, friends, and associates saved hundreds of his letters and boxes of miscellaneous materials, and scientists and librarians and archivists in Washington, Amsterdam, The Hague, and Beltsville have preserved those records. Meyer's 10 years as an agricultural explorer in Asia constituted a beginning; his death at the age of 42 did not mark an ending because men and women at the U.S. Department of Agriculture have nurtured and studied and propagated many of his introductions. His work still lives to serve as a source of further accomplishment.

BIOGRAPHICAL SKETCHES

1. FRANK NICHOLAS MEYER (1875-1918) was a Dutch-born plant explorer of Manchuria, Mongolia, Siberia, and China.

2. DAVID GRANDISON FAIRCHILD (1869-1954) was both a champion and an initiator of Federal plant exploration and introduction for the U.S. Department of Agriculture.

3. PALEMON HOWARD DORSETT (1862-1943) worked with David Fairchild and, in his absence, served as Acting Head in the Section of Foreign Seed and Plant Introduction; he also worked as a plant explorer for the U.S. Department of Agriculture.

4. A. J. PIETERS, Dutch-born, worked with the Plant Introduction Section in its formative years and later joined the faculty at the University of Michigan.

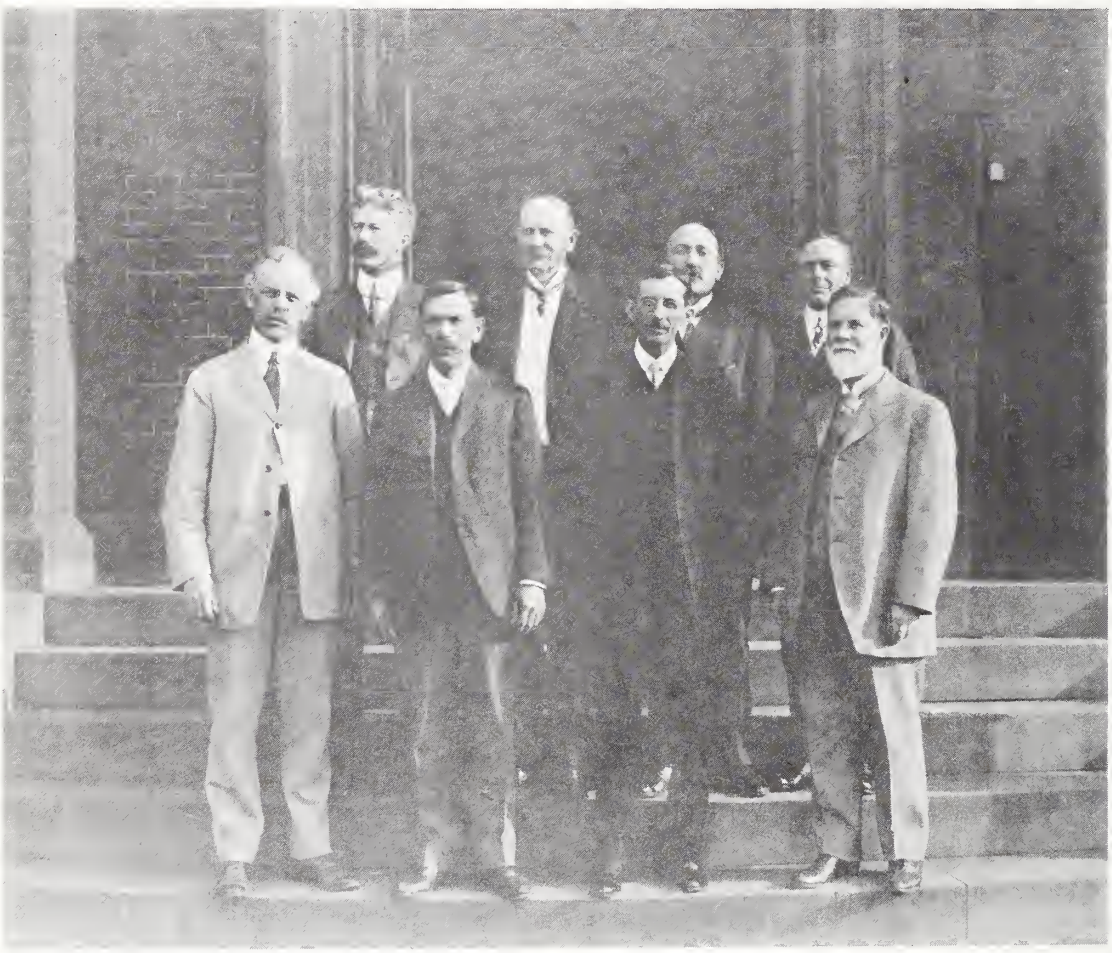
5. PETER BISSET, distinguished gardener, worked in and was a member of the Plant Introduction Section with the title of Expert Plant Introducer.

6. C. G. PFEIFFER worked with the Quarantine Section of the U.S. Department of Agriculture.

7. ERNEST HENRY WILSON (1876-1930) was a British plant explorer employed by the Arnold Arboretum; he was known for his work with ornamentals.

8. GEORGE MITCHELL was employed as the Supervising Tea Examiner for the United States in Hankow, China.

9. ERWIN FRINK SMITH (1854-1927) was a pioneer in early American mycology and plant pathology and was a leader in phytobacteriology for the U.S. Department of Agriculture.



BUREAU OF PLANT INDUSTRY
JANUARY 14, 1912

Group of the first workers in the Bureau of Plant Industry in front of the old brick Administration Building.
Back row left to right: Swingle, Walter T.; Waite, M. B.; Carleton, Mark A.; Woods, Albert F.
Front row left to right: Fairchild, David G.; Dorsett, P. H.; Galloway, B. T.; Smith, Erwin F.

REMEMBERING ROMEYN BECK HOUGH

BY

HARRY WILLIAM DENGLER*

The year 1980 marked the 75th anniversary of the U.S. Forest Service. Frank J. Harmon described its beginnings some 100 years ago in a timely and long overdue article entitled "Remembering Franklin B. Hough" (*American Forests*, January 1977). Readers of this magazine as well as most foresters undoubtedly were startled to learn of this upstate New York medical doctor who first conceived the need for conservation in America and so perseveringly and diligently laid the groundwork for what are now the various federal and state Forest Services, the forest tree nurseries, the network of forest experiment stations, the national, state, community, company, county, and city forests, the forestry schools and, of course, the profession of forestry itself in the United States.

It was equally surprising to read about the little known Romeyn Beck Hough--second son of Dr. Hough--and his contributions to today's knowledge of trees and the beauty and uses of their woods. Born on March 30, 1857, in Albany, New York, Romeyn inherited his parents' love for the out-of-doors and showed an early interest in the study of birds and plants. By the time he was 19 years old, he had accumulated a sizeable assortment of bird skins and mounted specimens. These were exhibited at the Philadelphia Centennial Exposition under the auspices of the then U.S. Bureau of Education to show the results of a boy's work in natural history.

At Cornell University he prepared for the study of medicine with electives in botany and ornithology. Here, he added materially to his as well as to the university's collection of bird specimens found in the vicinity of Ithaca, New York. For two years, at ages 25 and 26, he served as curator of ornithology at Cornell. He also worked briefly in Canada for the Smithsonian Institution collecting Indian artifacts for the museum's use.

Somewhere along the way, Franklin and Romeyn Hough--father and son--learned of the existence of Nordlinger's collection of small thin cross-sections of German and exotic woods. From this was conceived the idea of devising a machine to make larger sections--radial, tangential, as well as transverse--and, if the device proved successful, to use these in place of photographs for a proposed *Encyclopedia of American Woods*. Fifteen volumes were planned involving some 375 trees. The younger Hough undertook this task with the inspiration, counsel, and encouragement of his father. He finally developed a machine capable of cutting any thickness of wood--including some of incredible thinness--which he patented on February 9, 1886.

In his early experiments, Hough discovered that the transverse sections of certain species were of surprising strength, of almost ivory-like smoothness, and highly suitable for cards for commercial and personal purposes. He found their printing qualities to be unsurpassed by any paper and that they were ideally suited for decorating with India inks and oil or water colors since the inks would strike directly into the wood instead of seeping sideways as with paper.

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Hough found that these were prized for calling, place, and birthday cards, invitations, bookmarks, menus, postcards, receptions, and announcements--particularly for wooden wedding anniversaries and Arbor Day exercises. Greeting cards of appropriate woods and verses were most timely for various holidays; snow-white holly wood, for example, with colored green boughs, bright red berries, and black lettering, was found to be especially popular at Christmas. Their intrinsic interest, he noted, invited close inspection with a "magnifier," a feature which was not to be found in cards of paper. He discovered, too, that these wooden cards were not as apt to be discarded as were other cards. They were priced according to the quantity and the sizes ordered; in the latter case, it was from 7 through 15b, referring to their width. Interestingly enough, these numbers are expressed in centimeters rather than in inches.

Hough also sold blank cards--labeled or unlabeled as to tree species--and provided instructions on how best they could be printed, lettered, glued, colored with inks and oils, and punched with holes. All were made of sections so thin that 200 were needed to make a pile an inch thick. These were formed of a piece of transparent paper bonded together by a secret process between two thin slices of wood to form a single unit. Soon the demand for Hough's cards became so great that he was forced to erect and equip a factory for their manufacture at Lowville, New York, then the home of his parents.

Work eventually resumed and the first volume of *Hough's Encyclopaedia of American Woods* appeared in 1888. This volume, as well as subsequent volumes, consisted of two segments or fascicles: the first contained 25 sheets of wood sections; the second contained an explanatory text, ranging from 79 pages in the first to 38 pages in the last of the publications. Each volume covered 25 trees native to different areas of America and was bound in a soft leatherette jacket.

The texts included brief descriptions for each tree, citing their distinguishing characters, habits, physical and medicinal properties, and items of special interest. Hough's main emphasis was on the physical properties of the woods: specific gravity; percentage of ash; relative approximate fuel values; elasticities; modulus of rupture; resistance to longitudinal pressure and indentation and their weights.

The second segment of each volume--Hough called them "Parts"--consisted of 25 double sheets of light cardboard which framed window-like two by five inch radial, tangential, and transverse wood sections for each tree in the text. These were sufficiently thin as to show the natural colors, textures, and grains when held to the light. Both sides had black waterproof surfaces to avoid signs of soiling and each bore in gold-bronze letters its technical name in English, French, German, and Spanish. The separate loose-leaved sheets made them easier to study, compare, and pass around in classroom and conference discussions. Any damaged sheets were replaced at a cost of 10 cents each, postage paid, "upon receipt of order and properly packaged."

The two fascicles were loosely held together in a folder of sturdy cardboard and then enclosed in an outer shell, or slipcase, of heavy cardboard on the sides, fastened to two strips of wood--top and bottom--with round-headed upholstery tacks at each of the eight corners. This provided a sturdy dust proof cover which, when seen from any angle, appeared as a single book; truly an unusual and expensive but a most fitting method of packaging. *Hough's American Woods* and Part numbers were embossed in color on the front with the trees included in that issue printed on the back. Two types of bindings and colors were available: in green or brown cloth at $5.00 or in half morocco at $7.50 per volume.

Work on *American Woods* was again interrupted in 1892 and 1893 when Hough received an urgent call from the board of general managers asking him to prepare and display New York State's $9,000 forestry exhibit at the World's Columbian Exposition in Chicago, 1893. He served as superintendent for this department with four entries--one of which was the State's while another was his own--covering 2,722 square feet; all were awarded a total of four medals and four diplomas. Hough's exhibits consisted of his thin sections of

woods, photographs of trees and barks, preserved specimens of leaves, flowers, and fruits, and logs cut to show radial, transverse, and tangential grains of the wood of 106 species native to New York. Boughs of fresh balsam covered parts of the walls making the air redolent with perfumes of the Adirondack mountains.

The exhibit of Romeyn B. Hough at the New York Forest Products Exposition showing the books of which Mr Hough was the author (Reprinted from Lumber World Review, *June 10, 1914; Courtesy of the author)*

In obtaining the blanks for sectioning--small timbers in the rough--Hough felt duty-bound that each species be correctly named. To achieve this and to attest to their authenticity, he gathered many herbarium specimens and took numerous photographs of the trees involved.

The enormous expense in perfecting the wood slicer, labor, photographic supplies, taking pictures, travel outlay, credit, carrying charges, storage space, and transportation costs for his wood and tree specimens from the field to his Lowville home necessitated that each volume be sold as printed rather than held until sets were complete. These are as they appeared: Parts I-IV (1888, 1891, 1892, 1894) trees of New York and Adjacent States; V (1894) Florida; VI-X (1895, 1897, 1899, 1903, 1904) Pacific Slope; XI-XII (1910, 1912) Atlantic and Central States; XIII (1913) Southern Florida, the Bahamas, West Indies, and Central America; XIV (1928) Florida, the Bahamas, West Indies, Central America, Mexico, and Cuba. XIII was also issued with a special binding at $10 per copy for the lumber trade in these areas.

Romeyn B. Hough passed away September 2, 1924, before he could finish the last two volumes of his *Encyclopaedia*. His daughter, Marjorie G. Hough, completed Part XIV using sections prepared by him and his field notes. The last in the series was to include 25 exotic species which, when introduced to America as ornamentals, for their oils, tannins, or other uses, escaped cultivation and became naturalized.

The text of I contains an introduction to the study of trees with discussions on roots, stems, wood structures, leaves, flowers, and fruits. A series of simple drawings satisfactorily illustrates the different types of leaves, flowers, and fruits. Here, Hough provided a glossary of terms to be used throughout the series.

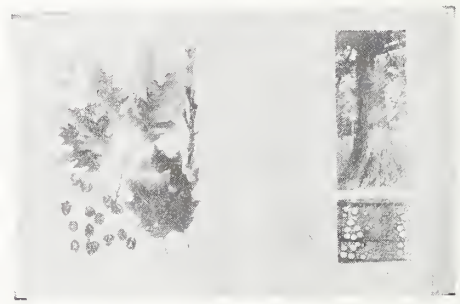
I also contains three separate keys for identifying the 25 trees in that issue. These are based on their flowers, fruits, and leaves and are to be used when one or the other is lacking. The keys continue, accumulating with each volume, until IX when the one pertaining to flowers is dropped. XI contains a key only to the leaves through that issue. XII contains a leaf key to all the trees of the northern states and Canada.

The last two volumes contain no keys but, for the first and only time, XIII includes excellent photographs of tree trunks along with an old-fashioned folding carpenter's rule to delineate sizes. As concerns these last 50 trees, Hough had considerable difficulty with certain woods, finding it impossible to make transverse sections of some suitable for use due to their brittle nature. Others had to be made in smaller sizes and several had to be protected with celluloid or mica because of their fragileness.

Each tree was numbered consecutively as it appeared in the *Encyclopaedia*. Indexes for the various texts provided this number and also the page on which it was described. English, French, German, and Spanish names also were included. A complete index of the 300 trees, Parts I through XII, trees of the northern states and Canada, appears in XII.

Romeyn B. Hough's *American Woods* was highly prized and praised by engineers, foresters, teachers, architects, and lumbermen. As soon as the first volume appeared, the New York State Department of Public Instruction ordered copies for each Normal School in the state. Sample comments of critics included the following: "a truly unique and novel publication"; "a contribution of rare value"; "first class in its line"; "an admirable work"; "impossible to commend too highly"; "beautiful, beautiful, beautiful"; "every high school and college should be provided with a set." The *New York Times* reported ". . . the sections are marvels of mechanical dexterity . . . most interesting . . . ."

From Hough's work on *American Woods* evolved his *Handbook of the Trees of the Northern States and Canada*. This book, which contained over 470 pages, appeared in 1907 and is still cited as an important reference to the identification and uses of American trees by students, foresters, and lumbermen alike. Its uniqueness and value lie in the carefully made photographic illustrations of the mature leaves, fresh flowers, fruits, and leafless branchlets of each tree against a background grid of one-inch squares. These necessitated much experimentation as to proper lighting in eliminating shadows and distortions. Page-length pictures show bark and trunk characteristics; range maps are also shown. All illustrations were on facing pages so that everything could be observed at one time.



Sample pages in the Handbook *opened at the Red Oak (Publication announcement; Courtesy of the author)*

For Hough, the task of gathering complete and accurate specimens must have been, at times, both a challenging and a frustrating experience. For instance, Hough recalled that he was unable to find a single sugar maple bearing fruit although he examined many from northern New York to North Carolina and westward to Missouri. Once, Hough searched in vain for two successive seasons to find female flowers of the common butternut so regularly did the late spring frosts kill them though the male blossoms appeared annually. This observation explains the scarcity of nuts in low-lying areas where these trees are native. The shortness of the period when the flowers and fruits remained in prime condition

called for close watch lest an entire season be lost. Hough considered this much more of a chore than procuring specimens from the tops of lofty trees. Often, too, he was bothered with trees having an "off-bearing" year when flowers and, of course, fruits did not occur.

Hough dedicated each issue of *American Woods* to those who were especially helpful to him. He gratefully acknowledged the assistance of many with his *Handbook of Trees*. A listing of these would read like a *Who's Who* of botanists, financeers, foresters, horticulturalists, and naturalists at the turn of the century. He laments the death of his father with the loss of his companionship and counsel:

> Among the happiest pictures of memory are those in which I see my father's delight, as I would show him, from time to time, my successful progress in devising a way of making sections for this work, and if only for the happiness which its appearance would have caused him, could he have lived to this day, I have felt duty bound to go on with it even though left to do it alone.

Of his mother, he stated, "To my mother as a partial compensation for the hours of anxiety occasioned her, while in boyhood quest after bird of flower."

In 1910, Hough published his *Leaf Key to the Trees of the Northern States and Canada*. This nicely done soft cover, pocket-sized booklet of 49 pages covers some 240 trees and tall shrubs--native and naturalized--north of North Carolina and east of the Rocky Mountains. Included was a 12½ page tersely but concisely written glossary which was, as the author remarked, ". . . really much more comprehensive than here required." His death in 1924, however, prevented the completion of a handbook and a key on the western trees as originally planned.

Hough offered for sale mounted or unmounted photographs of isolated trees, leaves, flowers, fruits, and branchlets as they appeared in his handbook. These were available also in stereopticon slides along with transverse sections of woods, the latter varying from 1/400 to 1/600 of an inch thick and beautifully showing the annual rings, medullary rays, cells, and ducts all in their natural colors. Likewise, transverse, radial, and tangential wood sections, mostly 1/200 of an inch thick, stained with methyl-green and mounted in Canada balsam for microscopic use. These sold for 50 cents each.

Besides the Columbian Exposition Award, Romeyn Beck Hough won medals for his exhibits at other fairs: Paris in 1890; Pan American in 1901; Louisiana Purchase in 1904, and the Grand Prize at the Alaskan-Yukon Exposition in 1909. Of all his awards, however, he was proudest of the Elliott Cresson gold medal and citation/scroll given him by the Franklin Institute of Philadelphia on January 3, 1908, in recognition of meritorious work for his *American Woods*.

The heavy large-sized Funk and Wagnall's unabridged *New Standard Dictionary of the English Language* (1944) has a full page of labeled, colored, radial sections of 20 typical woods from samples by Romeyn B. Hough, Lowville, New York. In *A Reverence for Wood* (Wilfred Funk, Inc., 1965), the author, Eric Sloane, duplicates the page of plates on a smaller scale but neither were the specimens identified nor was their source credited.

This writer's interest in *Hough's Encyclopedia of American Woods* dates back some 20 years when one of his students in "Introduction to Forestry" at the University of Maryland, brought to class a volume that the latter had purchased at the Salvation Army's second-hand bookstore in the District of Columbia for $1.00. Because of the manner in which these volumes were issued, ownership of complete individual sets would be rare indeed and even single copies are cherished possessions.

Fortunately, Hough sectioned enough wood samples for an eventual revision of his work. This was started back in the mid-1950's by the late E. S. Harrar, Dean of the School of Forestry at Duke University and is now being carried on by F.M. White, Director of the Duke Forest. Sixteen books of wood samples and texts I through VIII are currently available. The latter were brought currently up-to-date and enlarged to include historical notes of interest, relative importance, and ornamental values. They also contain tables of both mechanical and non-mechanical properties such as withdrawal resistance of nails and screws, weights in pounds per cubic foot at different moisture levels. The project, which is expected to be completed by 1983, is being printed by Robert Speller and Sons, Publishers, Inc., 10 East 23rd Street, New York, New York.

Romeyn Beck Hough was a member of the American Forestry Association and advertised quite frequently in *American Forests*. Ownership of his "Cards of Wood" has changed hands over the years and is now located in Belmont, Michigan 49306. The present firm has discontinued making several items such as Christmas cards and limits itself solely to business and personal calling cards. They have expanded their card line to include over 110 different native American species of wood. With some improvements, Hough's original machinery is still in use.

(Grateful appreciation for their valued help in preparing this article on Romeyn Beck Hough is expressed to the following: Mrs. Leonard K. Greer, Portland, Oregon, his daughter; Ms. Patricia Hough, Pawling and New York City, New York, his granddaughter; Louis Baucus, Lowville, New York, who worked for Mr. Hough as a teen-ager until the Hough estate was liquidated; Ms. Anita T. Karg, Hunt Institute for Botanical Documentation, Carnegie-Mellon University, Pittsburg, Pennsylvania, and Ms. Arlene Skoros Hall, Gould-Hough Cultural and Educational Center, Lyons Falls, New York 13368. The latter lacks a complete set of Hough's American Woods. *Gifts of any volumes or memorabilia of Dr. Franklin B. Hough or his son, Romeyn, would be very much appreciated).*

Romeyn Beck Hough standing in his office in Lowville, New York showing the 14-volume set of his Encyclopaedia of American Woods *as well as specimen sheets of samples. In the exhibit case can be seen his microscope slides, a copy of his* Handbook of Trees, *his key to the trees, and other memorabilia (Photograph courtesy of Patricia Hough, Pawling, New York and the author)*

NURSERY AND SEED TRADE CATALOGS

BY

JAYNE T. MACLEAN*

A charming book of collected essays by Katherine S. White called *Onward and Upward in the Garden* appeared last year. It was a review of nursery and seed catalogs, an appreciation of their authors' skills, and a sharing of the winter vision of sun-warmed earth and flourishing acres of flowers and vegetables and trees that these catalogs evoke. The wide popularity the book enjoyed testified to the degree that it touched a common chord in the fraternity of devoted gardeners.

By mid-summer, when one's garden is a reality, the catalogs so eagerly read and ordered from last winter are usually tossed out. In libraries where these trade lists are collected, most often they are discarded when the next year's edition arrives. Very few libraries in this country maintain long runs over the years or collect from large numbers of firms. There are good arguments for doing so.

One argument is their usefulness as primary sources for the research of plant scientists. For example, when a botanist is conducting a literature search to determine the first officially published description of a species or variety, or to trace a hybrid plant's origins, or to review the emergence of such characteristics as variegations or mutations, one of the most important sources he may consult is old nursery and seed trade catalogs. A plant's official name must be unique, so plant breeders or registration authorities check to see whether a proposed name for a newly discovered or hybridized plant has been used before. Often, in catalogs, are found announcements of plant varieties imported or developed by the commercial plantsman, using his catalog to disseminate the information rather than a journal or a newspaper. These catalogs have over time ranged from one-page broadsides to lavishly illustrated tomes complete with growing instructions or discourses on the joys of horticulture.

The National Agricultural Library's (NAL's) important special collection of nursery and seed trade catalogs was begun by an enthusiastic collector, Percy L. Ricker (1878-1968), who was a USDA economic botanist, taxonomist, and wildflower expert.[1] He received an initial gift of 200 19th century catalogs which were duplicates from the Massachusetts Horticultural Society's collection, still one of the eminent collections in the United States. Over the years, gifts, exchanges, and purchases have increased the NAL collection to its present stature as the most extensive in the country. It is the repository for the archival collections of a number of prominent old nurseries and welcomes donations of catalogs from any nursery and seed firms who announce their wares via catalogs.

Other major collections around the United States and Canada include that of the Bailey Hortorium at Cornell University, both the New York and the Brooklyn Botanical Garden libraries, the Missouri Botanical Garden, the Denver Botanic Garden, and the Royal Botanical Garden library in Hamilton, Ontario. Taken together with the NAL collection, these records present an accurate picture of the firms in the nursery and seed trade during the whole period from the time of the Revolutionary War to the present day.

Professional nurserymen and seedsmen were already doing business in this country by the time of the Revolution, although botanists and gardeners on both sides of the Atlantic had been trafficking in and exchanging seeds and plants from the earliest Colonial times. One of the first indigenous catalogs known was issued by William Prince, of Flushing, New York; it was a broadside listing fruit trees

CATALOGUE

OF

AMERICAN INDIGENOUS

TREES, PLANTS, AND SEEDS,

CULTIVATED AND FOR SALE AT THE

LINNÆAN BOTANIC GARDEN,

Flushing, Long-Island, near New-York.

WILLIAM PRINCE, PROPRIETOR.

NEW-YORK:

PRINTED BY T. AND J. SWORDS,

No. 160 Pearl-Street.

1820.

(Both imprints courtesy of The Nursery and Seed Trade Catalogs Collection, National Agricultural Library)

CATALOGUE

OF

GREEN-HOUSE PLANTS, HARDY TREES, EVERGREEN SHRUBS, FLOWERING SHRUBS, BULBOUS ROOTED, AND HERBACEOUS PLANTS.

ARRANGED BY THEIR

BOTANICAL AND ENGLISH NAMES.

TO WHICH IS ATTACHED

THE PLACE OF THEIR NATIVITY;

With a collection of the most esteemed varieties of

FRUIT TREES,

AND A CATALOGUE OF GARDEN SEEDS.

CULTIVATED AND FOR SALE AT THE NURSERIES AND GARDENS OF

DAVID & CUTHBERT LANDRETH,

Federal street, near the Arsenal.

PHILADELPHIA:

Printed for D. & C. Landreth, No. 85 Chesnut street.

J. Ashmead, Printer.

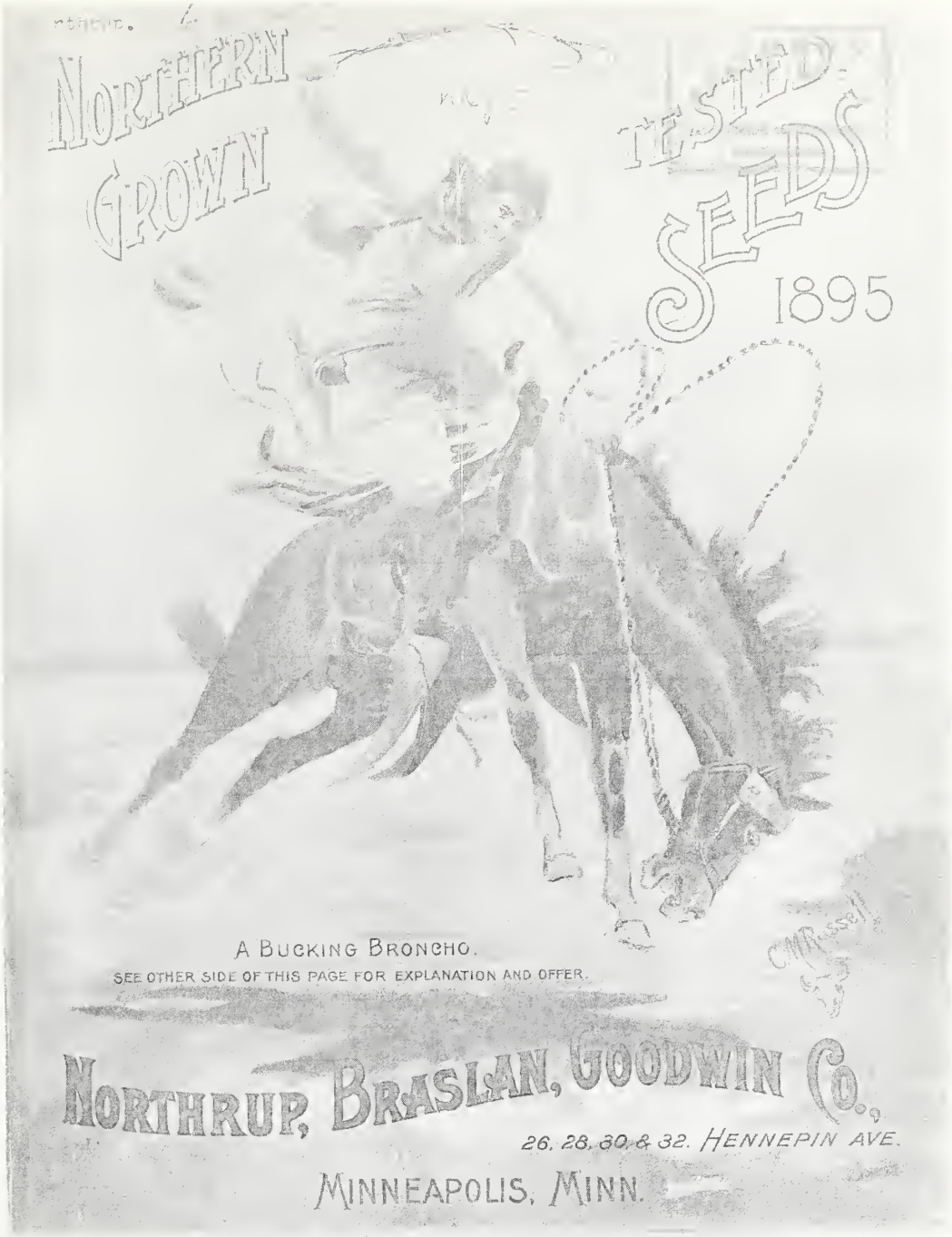
1826.

*JAYNE T. MACLEAN is a Reference Librarian at the National Agricultural Library Building, Science and Education Administration, Technical Information Services, Beltsville, Maryland.

for sale and bore the date of 1771. The Prince family tradition in the nursery trade continued through three generations to 1866. Other nurserymen who were established by around the turn of the 19th century included David Landreth Seed Company of Philadelphia (first catalog issued in 1811); Bernard M'Mahon, also of Philadelphia, most famous for his multi-edition book, *American Gardener's Calendar*, which was first published in 1806 and continued for 60 years; also Ephraim Goodale of Bucksport, Maine, John Bartram & Son of Philadelphia, and Grant Thorburn & Son of New York. Examples of the catalogs and advertisements of these early plantsmen fortunately have been preserved in some public and private collections. Selections from NAL's collection are illustrated herein.

Others who find in nursery and seed catalogs a rich vein of material are social historians investigating the daily lives of groups of people in various periods and sections of the country as they shaped, and were shaped by, their surroundings. Glimpses of industrial and economic history are also found as, frequently, gardening and farming implements appear in the same catalogs as plants and seeds. Art historians are able to gain insights into popular tastes during a given period. Specialists in landscape or garden restoration find many important clues to plants used at a particular time and to styles of layout and design of gardens.

(Courtesy, The Nursery and Seed Trade Catalogs Collection, National Agricultural Library)



A Buckin' Broncho

It occurred to us that it might be pleasing to our customers, if, instead of the pretty but sometimes meaningless pictures ordinarily shown on catalogue covers, these same covers could, without additional expense, be used in a way that would render the illustration interesting and really worthy of preservation.

The subject we present possesses, in addition to its artistic merit, added interest as being the work of a genuine "cowboy." The original painting, of which the cover is an exact reproduction both as respects coloring and drawing, is the product of C. H. Russell, better known as "The Cowboy Artist." He is considered by critics the best living portrayer of Indian and Cowboy life. His pictures are eagerly sought and command good prices, but are not easily procured owing to the difficulty with which he is induced to paint.

We know that our friends in the Northwest, where his work is well-known, and very greatly admired, will be glad to secure a copy of one of his best efforts. We hope, also, that our patrons in the East, South and all sections will feel interested in seeing a representative piece of work by an artist who, while possessing talent that would, if exerted in different circles, bring him wealth and reputation, has for years followed and still clings to a life filled with hardship and privation.

For the benefit of those who would like a copy of this picture for framing, we have had a number of handproofs taken, of suitable size for the purpose, on fine plate paper, **without wording of any kind.** This will be carefully packed and sent postpaid to any address on receipt of **25 cents**; or, if **especially asked for**, it will be sent as a **premium on orders for seeds in packets amounting to $1.00.** This offer, however, does **not** apply to Seeds in **collections**, or where other premiums are chosen.

Respectfully Yours,

NORTHRUP, BRASLAN, GOODWIN CO.,
MINNEAPOLIS, Minn.

(Courtesy, The Nursery and Seed Trade Catalogs Collection, National Agricultural Library)

Unfortunately, at a time when the horticultural trade catalogs are becoming recognized as a valuable resource, they themselves are becoming increasingly scarce. Part of the problem has been lack of recognition of their value as research material. Once their current usefulness as a purchasing tool was over, most of the catalogs were treated as the ephemera they were actually intended to be and discarded. Another aspect of the problem, very real in most libraries, historical societies, and such institutions where collections exist, is shortage of storage space. This adds to the temptation to do away with what seems to be outdated and useless publications.

In collections that contain historical catalogs another problem prevails--the actual disintegration of the paper on which they were printed, a problem they have in common with many older books, pamphlets, and periodicals. Preservation measures, such as the encasing of materials in acid-free folders or boxes, are expensive and time consuming, and are usually undertaken for only the most valuable items. (Incidentially, according to reports from rare book dealers, old and rare catalogs now enjoy a considerable monetary value).

An organization which has become increasingly concerned about the disappearing horticultural catalogs is the Council on Botanical and Horticultural Libraries (CBHL), one of whose members is the National Agricultural Library. The Council has set in motion a nation-wide survey intended to discover, initially, what institutions have collections of catalogs and, later, what the actual holdings consist of--i.e., the companies represented and for what years. The polling of likely institutions is being conducted by Council members on a regional basis, using a standard questionnaire. The information requested includes:

- Do you have nursery or seed trade catalogs?
- In approximately what quantities?
- From what time periods? (before 1830, 1830-1870, 1870-1920, or contemporary?)
- Is the collection listed or catalogued?
- What geographic areas predominate?

The survey is still incomplete, but the interim report yields eye-opening results. In the 20 states and provinces of the United States and eastern Canada so far surveyed, only about 180 libraries or other institutions reported any holdings of either historical or current catalogs, many fewer locations than had been estimated before the survey. The librarian of the Andersen Horticultural Library, University of Minnesota, completed the survey of her assigned region and issued a "Report of Nursery & Seed Catalog Collections in the Upper Midwest" in early 1980 covering Minnesota, Wisconsin, North Dakota, and South Dakota. A total of 411 questionnaires were mailed to likely repositories, including colleges, historical societies, active nurseries, and public libraries. Out of the 187 returns, 134 reported having no catalog holdings while 53 reported having collections, 39 of them consisting of less than 100 catalogs. Other regions will be completing their surveys and final tabulations are due to be announced in 1981. Anyone knowing of holdings of catalogs which may have been missed in our polls is asked to send the information to Jayne T. MacLean, National Agricultural Library, TIS/SEA, USDA, Beltsville, MD, 20705.

Preliminary to the Council's survey, the National Agricultural Library reproduced several copies of a record of its retrospective file of catalogs; this was made available to various members as a resource for the regional polling. At first, it had been hoped that this list could serve as the jumping-off point for a union list of nursery and seed trade catalogs. A review, however, by CBHL members of the problems inherent in trying to compile such a complex listing, mainly by volunteers, showed it to be infeasible. The Library's records of currently received catalogs have recently been given a face-lift, as an automated check-in system has been designed to facilitate record-keeping and assist the curator of the collection, Mr. Henry Gilbert, and the Reference staff in retrieving information from the catalogs. So far, records for 1978, consisting of about 500 catalogs, have been computer-loaded and can be searched on-line and the updates for the 1979 and 1980 records are soon to be entered. Incoming catalogs can be recorded on the file using a computer terminal in the Reference office which is linked to a PRIME computer elsewhere in the building. Printouts from the file can be easily produced and, if desired, can list only retail firms or wholesale or several other categories of plantsmen. Lists by states are just as easily available should an inquirer wish to know, for instance, the names of nurseries in Ohio that deal in woody plants, inclusive of their names, addresses, and phone numbers.

Through articles, checklists, newsnotes, professional meetings, and other available means, TIS/NAL will continue to do its part in stimulating the user and articulating the current and retrospective importance of this rich source of horticultural and botanical information. The individuals and institutions committed to this worthwhile responsibility welcome your comments, interest, and support.

(Courtesy, The Nursery and Seed Trade Catalogs Collection, National Agricultural Library)

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(Courtesy, The Nursery and Seed Trade Catalogs Collection, National Agricultural Library)

THE DEVELOPMENT AND IMPORTANCE OF THE NATIONAL HERB GARDEN

BY

HOLLY HARMAR SHIMIZU*

The National Herb Garden at the U.S. National Arboretum, Washington, D.C., is an outstanding example of a cooperative effort between the Federal Government and the private sector. The idea for this garden was introduced by The Herb Society of America in 1965. In the years of planning that followed, the Society dealt with and resolved many problems, including legal obstacles, fund raising, design, and support from the Congress. This prominent addition to the United States National Arboretum was dedicated on June 12, 1980. Within the beautiful two and one half acre gardens, thousands of plants are growing that were, are, and will be of importance to mankind.

In addition to being the country's national showplace for herbs, by Congressional mandate, the Arboretum is also concerned with research and education concerning these plants. Taxonomic studies are taking place so that material will be both authentic and properly named. For example, a true form of the Greek oregano (*Origanum onites*) was obtained for the Arboretum. After thorough research, it was found to be an authentic species not yet available in this country. Moreover, plants being sold as Greek oregano by American growers were not the true form. Consequently, the Arboretum propagated and distributed plants of Greek oregano to commercial growers throughout the country. In the trial and propagation area, new plants are tested and studied for future use. For example, a collection of plants with possible insecticidal qualities is being grown for research and use in the garden. Fresh plant material for use in research is sent to other local institutions such as the University of Maryland's Botany Department, the U.S.D.A.'s anti-cancer research group in Beltsville, Maryland, and the National Institute of Health, Taste, and Smell Research. Future plans include working with the herb and spice industry in cooperative research. In addition, computerized lists of useful herbal plants, including trees and shrubs, were compiled. This was a cooperative project between The Herb Society of America and The National Agricultural Library. These plant lists were researched, typed on special paper, and then scanned by the computer to go into its memory banks. The list, comprised of some 2,000 herbal plants, trees, and shrubs, offers condensed factual information and is easily available from the computer. This is a major horticultural contribution.

Part of what makes the National Herb Garden so special is the exquisite design by Mr. Tom Wirth of Sasaki Associates, Watertown, Massachusetts. He created a fascinating interplay between levels, displays, trellises, hedges, and vistas. There are three main "rooms" which make up the garden. Starting up the brick-paved entrance, lined with dwarf English boxwood (*Buxus sempervirens* 'Suffruticosa'), one sees the first main point of interest--the knot garden. This garden is on a lower level than the brick pavement of the reception area so that the intricate patterns of the knot may be viewed from above. This particular "knotte" is quite a bit larger than its Tudor ancestors, measuring approximately 50 feet long and 25 feet wide. The plants, chosen for their contrasting textures and colors, are arranged to resemble interwoven chains. Many knot garden designs were taken from embroidery patterns, which explains the unique vocabulary used in this reference, i.e. beads, plums, wreaths, and interlacing. The Arboretum's knot is termed a contemporary interpretation because dwarf evergreens with an ancient herbal use, rather than herbaceous plant material, have been used. This knot design also provides a more attractive appearance throughout the year and requires less maintenance.

In the next major area, The Historic Rose Garden, over 100 old or historic roses have been planted. Throughout the centuries, roses have been the favorite flowers of mankind. Roses are important herbs; their value includes the use of hips (fruit) in medicine as a source of vitamin C (by eating them raw), and for making delicious tea and jam. The petals can be used to produce rose water, to make a fine candy, and to create pot-pourri. Certain old roses are grown commercially for the production of attar of roses, an essential ingredient in the perfume industry. Last of all, the old roses add magnificent fragrance and loveliness to the garden. To quote Walter de la Mare:

> Oh no man knows
> Through what wild centuries
> Roves back the rose.

Despite the multiple virtues of these old roses, many have not been perpetuated. These roses were extremely popular until the development of the hybrid tea in 1867. The hybrid teas were prized for their long flowering season and upright flowers. What is finally being realized today is that, in giving up the older rose, much has been lost (e.g. the ability to provide scent was lost totally in many hybrid teas). Through its garden and distribution program, the National Herb Garden will play a vital role in the revival of the "lost" roses.

The third and largest section of The National Herb Garden is the area containing ten specialty gardens arranged around a great oval lawn. The gardens are separated by boxwood hedges and designed on a slope to facilitate drainage and to enhance visibility of the plant material. Each garden has its own unique theme and include the following:

1) *Dioscorides' Garden*--These herbs were described by Pedanus Dioscorides who was the outstanding Greek physician and author on botany during the first century A.D. His vast book *De Materia Medica* covers hundreds of medical plants and was the standard reference for 1,500 years;

2) *Dye Garden*--This garden contains plants used in the past and present for coloring natural fibers such as wool, cotton, linen, and silk. Although many synthetic dyes are available, many fabric workers choose to use natural dyes for they offer subtle earthy colors;

3) *Early American Garden*--Many plants used by the colonists were brought from the Old World while others were native to America. Using herbs, they improved their nutrition, flavored food, made medicine, dyed clothes, kept away pests, and added pleasant fragrance to their homes;

4) *American Indian Garden*--This garden represents plants used by Eastern North American Indians. They used their intuition in determining plant usage. Many of our modern applications are based upon Indian plant usage. In fact, because the Indians shared their knowledge, many settlers were able to survive the transition to life in a new country;

5) *Plants in Medicine*--This collection contains

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plants used in modern medicine or from which alkaloids have been extracted for medicinal use. Many of these plants are now used in anti-cancer research and other medicinal research;

6) *Culinary Garden*--These herbs, used for flavoring and seasoning food, are important for man's health, especially for individuals on restricted diets. Generally, fresh herbs give the best flavor and dried herbs are convenient for winter use. The time for harvesting depends on the part of the plant being used, whether it be flower, leaves, seeds, stems, or roots;

7) *Industrial Garden*--These plants supply sources of fuel, fiber, and other essential products in industry. There is scarcely a sector of industry that does not use botanical resources in some way;

8) *Fragrance Garden*--The plants in this collection are used for their fragrance and many are the sources of essential oils used in the perfume industry. Others are used to make pot-pourri and other fragrant products;

9) *Oriental Garden*--This group of oriental plants has a broad range of applications. Oriental herb usage is said by legend to have originated in China under the Emperor Shen Nung in about 2,780 B.C. Due to his initiations, a "Great Herbal" was published in China. From that point, the use of herbs became a way of life in China and, over the centuries, gradually infiltrated into other countries by trade routes;

10) *Beverage Garden*--These plants are used for flavoring teas, liquors, and other beverages. Herbal beverages certainly are not new. Teas are made by boiling leaves, roots, or seeds of the desired plant. Mixtures of herbs are often used to enhance flavor. The root of ginger, for example, is used to flavor ginger ale, ginger beer, wine, and brandy.

The specialty gardens cover a vast range of plant material. Plants are all labeled so that a walk through the gardens can hardly be anything but educational. In addition to the specialty gardens, the trial and propagation area allows new plants to be grown for research and evaluation.

With the growing importance and awareness of herbs in today's society, the establishment of The National Herb Garden was a timely and relevant event. When man has needed a new idea or a new product, he has often turned to nature for the solution. Herbs have helped develop civilizations and, through the ages, to the wonder and amazement of many, have proved helpful in solving some of the problems confronting the world.

The new National Herb Garden serves as a working garden for research and as an outdoor classroom for the public at the U.S. National Arboretum. Above, Holly Harmar Shimizu, the Herb Garden's curator, leads a workshop on growing herbs (Photo courtesy U.S. Department of Agriculture and the author)

FAMULUS AND THE HERB GARDEN

BY

HAZEL L. POLLARD*

The United States Department of Agriculture has offered a computer-based documentation system designed to aid researchers in building individualized data bases since 1969. The program, called FAMULUS after the name given private secretaries of medieval scholars or alchemists, is unique in its simplicity.[1] Composed of eight routines which can be divided into areas of data management, file manipulation, information retrieval, and thesaurus construction, it enables researchers to use the computer to edit, revise, collate, index, sort, search, and build vocabulary or keyword lists with their own material. Although originally designed for bibliographic data which could be broken into segments such as author, title, source, date, and keywords or abstracts, many different applications have evolved since 1969 such as an inventory of the National Fungus Collection, holdings of a USDA field library, a file consisting of herbicide and pesticide testing results, and an inventory of animal disease photographs.

Before a new file can be started, the user must determine exactly what he wants the system to do for him. Then he must decide the manner in which the data will be subdivided. There can be up to 150 of these divisions, called fields, in each record. The internal structure in each field is also important since it will determine the flexibility with which data can be retrieved. Each record may consist of 24,000 or fewer characters. Originally, all data was keypunched, but now the majority of users type the data onto special forms, using IBM Selectric typewriters equipped with a 210 element. These forms are then read onto magnetic tape by an Optical Character Reader.

Early in 1977 work was begun on the design of a FAMULUS file for the proposed National Herb Garden. Mrs. Caroline Cadwalader, Chairman of the National Herb Garden, Mrs. Elizabeth Rea, President of the Herb Society of America, Dr. John Creech, Director of the National Arboretum, Dr. Hilary Burton, Mrs. Abigail Weiner, and other members of the Science and Education Administration developed a list of 28 fields into which each record would be divided. They are:

PINO (Plant Introduction Number)
NANO (National Herbarium Number)
SCNA (Scientific name, Authority and Family)
SYNO (Synonyms)
COMM (Common names)
COUN (Native Country)
HUZM (Hardiness USDA ZONE MAP)
FRUI (Fruit)
TYPE (Growth Type)
FOLI (Foliage)
FLOW (Flowers)
BARK (Bark)
NAHA (Native Habitat)
SOIL (Soil Type)
EXPO (Exposure)
PROP (Propagation)
DISE (Diseases)
INSE (Insects)
TXIC (Toxic)
LAND (Landscape Uses)
MEDC (Medicinal Uses, Historic and Current)
BEVR (Beverage Uses)
FRAG (Fragrance)
INDS (Industrial Uses)
COSM (Cosmetic Uses)
DYEC (Dye Properties)
CHEM (Chemical Components of Active Ingredients)
ADNO (Additional Notes and References)

Many fields were, in turn, subdivided. TYPE, for instance, was divided into growth form, condition, size, and type of plant (Herb, shrub, tree) and FLOW was divided into quality, color normal blossoming period, and Washington, D.C. blossoming period. When indexing or searching for plants with like characteristics, individual bits of information can be retrieved by using sets of delimiters such as double commas, double colons, or double semi-colons. Mrs. Weiner did a masterful job of incorporating all of this information onto a one-page form with a very simple format. After members of the Herb Society completed the forms with as much information as was available to them, all the typist had to do was transcribe the information exactly as it appeared on the form. An example of one record looks like this:

SCNA Lonicera japonica Thumb., Caprifoliaceae
SYNO Nintoca japonica
COMM Japanese Honeysuckle, Gold and Silver Flower
COUN E. Asia
HUZM 5
TYPE Vine,, Evergreen;; Climbing
FOLI 2;; Dark Green,, Medium
FLOW Conspicuous,, white, yellow:: 8,9,10
BARK N
SOIL Loam
PROP Seed, Cutting, Layer
LAND Ground cover
FRAG N 6 #61 Pg. 114, 6 #60 Pg. 140-141
ADNO Woodland weed in mid-atlantic states, Hortus Third 1976 Pg. 679, Rampant vine

Thus, the information on *Lonicera japonica* includes the authority, family, synonym, and two common names. Its natural habitat is Eastern Asia but it is found throughout the fifth hardiness zone. It is a climbing evergreen vine with conspicuous white or yellow flowers which bloom in June and July and the fruit, fleshy and black, appears from August through September. The bark is not ornamental and the soil type is loam. It can be propagated from seed, cuttings, or layering and can be used as ground cover. Its flowers have a nocturnal fragrance. Several references are also included. Although this is quite a lot of information, the FAMULUS system allows for more to be added later, such as blossoming period in the Washington, D.C. area or National Arboretum number.

With information on more than one thousand plants now in the system it is possible, for example, to create lists of all plants useful in medicine which have red fruit or all herbs which do not exceed six inches in height. The combinations are almost limitless. It will also be possible to input all new information about individual plants growing in the garden which may not have been commonly known before. There is every indication that the FAMULUS file will provide a useful working tool for the Curator of the Herb Garden and will continue to be developed and refined with the ever-changing plant introductions into the Garden.

*HAZEL L. POLLARD is a Technical Information Specialist who is Head of the Current Awareness Literature Service, Science and Education Administration, Technical Information Systems, Beltsville, MD.

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A partial view of the Specialty Herb Garden being maintained (Photo courtesy U.S. Department of Agriculture and the author)

NEW  ACQUISITIONS

The National Agricultural Library collects materials covering the broad spectrum of agricultural and related sciences. The mission of NAL is to support the research and program needs of the Department, to serve as a depository of agricultural information, and to provide useful information on subjects connected with agriculture to the people of the United States.

This section provides a selective listing of recent NAL acquisitions. The list for this issue focuses on plant science and reflects the variety and range of titles currently received and processed by NAL. Plant science is a major area of research in the agricultural sciences and, as such, is collected on a comprehensive basis, on all levels of interest from the home gardener to the doctoral researcher. The NAL call number is provided with the title (if available).

Persons having questions or suggestions concerning this listing should contact Beth Whiting, Cataloging Section, Room 110, NAL Building, Beltsville, MD 20705.

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BOOK REVIEWS

Persons interested in reviewing books, having books reviewed, or simply having questions about the reviews should address their correspondence to Tom Fulton, Journal of NAL Associates, *Room 150, GHI Building, 500 12th Street, S.W., Washington, D.C. 20250.*

Meister, Dick and Anne Loftis. *A Long Time Coming--The Struggle to Unionize America's Farm Workers.* (New York: Macmillan Publishing Company, 1977, 241 pp., $14.95).

One of the more notable developments in farm labor during the 1970s was the successful effort on the part of California farmworkers to organize and bargain collectively with their farm employers. Since the enactment of the National Labor Relations Act in 1935, farmworkers have been categorically excluded from the organizing and collective bargaining rights afforded most other workers in the United States. Currently there is no Federal legislation which requires growers to recognize farm labor unions or negotiate with them concerning wages, hours, and working conditions. In 1975, however, under the active encouragement of Cesar Chavez and the United Farm Workers' Union, California became the first state to enact legislation guaranteeing farmworkers the right to act together to help themselves, to engage in union agricultural activity, and to select their own representatives for bargaining purposes. This book, *A Long Time Coming*, is the history of that "struggle to unionize America's farmworkers."

The authors, Meister and Loftis, locate the historical origins of the California movement in the formation of the Agricultural Workers' Organization of the International Workers of the World (Wobblies) and, later, in the Communist party-backed Cannery and Agricultural Workers' Industrial Union. Both unions achieved moderate successes in organizing farmworkers and bargaining for improved wages and working conditions but their violent strike methods and unfavorable political ideologies ultimately led to their dissolution in the lates 1920s.

California, however, was not the only state torn by farm labor strife. Fierce organizing struggles were also being waged in Arkansas and several southern states under the leadership of the Southern Tenant Farmers' Union (STFU). This union successfully organized thousands of poverty-stricken share-croppers and tenant farmers and, during its brief history, was affiliated for a time with both the AFL and the CIO. In the end, however, the southern agricultural system was the victor: "Southern farmworkers would remain virtually defenseless . . . for they could not establish a union strong enough to long withstand the awesome power of the plantation owners who controlled every phase of life in the rural South." Today, the southern plantation system no longer exists but the poverty, deprivation, and powerlessness of many southern farmworkers is still a reality.

Three unions had collapsed in failure by the early 1940s and organizing efforts during the next 20 years were to be severely hampered by "strangers in our fields"--the Mexican Braceros. Public Law 78--the Bracero Program--authorized an agreement between Mexico and the United States which was designed to meet the U.S. war time need for supplemental farm labor. Meister and Loftis argue that instead of being a supplemental farm work force, the braceros were an alternative labor force, taking needed jobs away from American citizens, depressing farm wages, and raising an insurmountable barrier to farm unionization. After years of controversy, the Bracero Program was finally terminated in 1964, largely as a result of increased mechanization, enforcement difficulties, and rising levels of unemployment in the United States. Growers, now deprived of their Mexican labor supply, were forced to improve housing, wages, and working conditions to attract domestic workers. Despite these improvements, farm labor wages and working conditions were still below those of other workers in the United States. It was time for the "coming of the union."

As the authors note, increased awareness of poverty and the successful militancy of the civil rights movement encouraged union growth, especially in California. In the late 1950s, two unions had emerged--the Agricultural Workers' Organizing Committee sponsored by the AFL-CIO and the National Farm Workers' Association in Delano under the leadership of Cesar Chavez. These two unions eventually merged into what is now the United Farm Workers' Union (UFW) and Meister and Loftis provide a detailed description of the UFW's organizing and strike activities during the 1960s. The first strikes were aimed at the largest grape growers--DiGiorgio and Giumarra--for higher wages, improved working conditions, and union contracts. Almost two years later, the grape growers agreed to negotiatiate with the union. Despite the unprecedented victory, UFW's concrete gains were small and they turned their efforts to other grape growers and lettuce producers as well. Union activities began to spread outside of California into Arizona and Florida. In California, however, organizing and strike activities were being hampered by the Teamsters Union which was attempting to represent farmworkers at the bargaining table. Representational struggles became violent and bitter. Meister and Loftis trace union development up to the proposal and enactment of the California Agricultural Labor Relations Act (CALRA) in 1975. This Act not only required growers to recognize and bargain collectively with farm labor unions but also established a California Agricultural Labor Relations Board to monitor union activities and hear complaints from unions and growers. The authors believe that much remains to be done in California but conclude with a plea for continued unionization efforts throughout the United States.

The strength of the Meister and Loftis book lies in its comprehensive coverage of the historical development of farm labor union activities in the United States. Unlike many other books on this topic, *A Long Time Coming* does not limit itself solely to farmworker unions in California but also examines union activities in Hawaii, Arizona, and the South. The historical analysis of the early attempts to unionize farmworkers is particularly well-done and the detailed tracing of strike and boycott activities of the UFW during the

1960s and 1970s is particularly useful in showing power struggles among the various factions. The authors successfully combine historical statements with first-hand commentary, thus producing a very readable contribution to the literature. Their historical analysis, however, could have been improved with greater attempts to document and reference their findings. Unfortunately, this is a common trade-off when attempting to construct a readable, non-technical literary work.

It is often difficult for a researcher to maintain his/her objectivity when dealing with a group as disadvantaged and powerless as our Nation's farmworkers. Loftis and Meister are successful for the most part in avoiding this pitfall. Only in their discussion of the recent UFW activities do these authors appear to succumb to the charismatic charms and romantic idealism of Cesar Chavez. Fortunately, they save themselves by noting that the "final outcome is a long way off" and that the UFW and CALRA are far from bringing "justice and peace to California agriculture."

In reading this book, the general public should be careful to note three points which are not well emphasized. First, while much needs to be done to improve the living and working conditions of farmworkers, progress is being made. Agricultural workers are now covered by child labor laws, a minimum wage equal to that of nonfarm workers, unemployment insurance, and workmen's coverage in some states. In addition, various Federal agencies operate multi-million dollar programs designed to improve the educational, employment, nutritional, and health status of hired farmworkers. Second, *A Long Time Coming* is the history of the farm labor union movement from the perspective of the farmworker. It is seldom that the reader is shown the grower's view on unionization or the rationale surrounding his beliefs. Economic survival is an important and relevant issue to both growers and workers. Finally, unionization is not the only means to help alleviate some of the social and economic problems that farmworkers face and alternative methods do exist. These options include improving employment stability by creating conditions that allow more farmworkers to be employed on a year around basis, increased use of the hiring hall which matches workers to available jobs, continued funding of Federal assistance programs, and additional Federal legislation to help protect our Nation's farmworkers.

In summary, taken in the proper perspective, *A Long Time Coming* traces an important period in the history of farm labor organizing and makes a valuable and needed contribution to the literature on the subject.

Reviewed by Leslie W. Smith, Sociologist, Economic Development Division, Economics and Statistics Service, U.S. Department of Agriculture.

New Directions in Urban-Rural Migration: The Population Turnaround in Rural America. Edited by David L. Brown and John M. Wardwell. (New York: Academic Press, 1980, 412 pp., bibliographies, illustrations, index, $29.50).

This book is a collection of essays dealing with the turnaround in population from larger cities and metropolitan areas to small towns and rural areas. The research was originally reported at a migration research conference sponsored by the United States Department of Agriculture and held in Snowbird, Utah, in October of 1978. It is the result of participants from the North Central, Northeastern, and Western regions of the United States.

The book is made up of four sections. The first section of essays deals with "Urban-Rural Migration in the 1970's" and documents the population turnaround for that decade. It points out the changes in dependence on farming, rural employment, and the growing number of rural residents who commute to work in metropolitan areas. This section also analyzes the gap between the changes in economic and social conditions and the reasons that the necessary policy and program changes have not been made to meet the needs of people in these areas.

The second section explains the reasons for the urban-rural population turnaround. Comparisons are made with other developed societies as well. An economic theory and a residential preference theory are offered as explanations for the migration turnaround. Other factors such as migrants as workers are also discussed.

Migration trends and consequences in rapidly growing areas is the topic of the third section of writings. Regional growth trends are analyzed and various causes for migration are examined using studies done in the various regions of the United States.

In the final section, the writings point out the strengths and weaknesses for using the data resources available for population distribution research and various strategies employed in collecting statistics. Each of these sections is further enhanced with charts, graphs, tables, and other forms of illustration. The bibliographies which appear at the end of each essay point out further readings on each topic and an index can be found at the end of the book.

This book is recommended for use as a textbook of readings in population studies courses. It was found to be written in a clear and concise format.

Reviewed by Dorothy A. Heise, Reference Center, Economics and Statistics Service, U.S. Department of Agriculture.

A vineyard in early America (Courtesy, John Maas)

OF

NEWS  NOTE

NOTED HORTICULTURIST TO HEAD U.S. NATIONAL ARBORETUM

On May 27, 1981, Henry Marc Cathey, an authority on plant growth regulation and ornamental plants, was named Director of the U.S. National Arboretum by Anson R. Bertrand, Director of Science and Education for the U.S. Department of Agriculture.

Dr. Cathey had been Chief of the Florist and Nursery Crops Laboratory in the Science and Education Administration's Horticultural Science Institute at Beltsville, MD, since 1972. During the past year, he has been the first appointee to the D.C. Kiplinger Chair in Floriculture at Ohio State University where he prepared an assessment of the future priorities and problems of ornamental and flowering plant research. He was President of the American Horticultural Society from 1974 until 1978.

The National Arboretum, a major USDA research institution with 444 acres for plant breeding and cultivation on the edge of Washington, D.C., is famous for its collection of camellias, azaleas, dwarf conifers, and other ornamental plants. It houses the National Bonsai Collection and the National Herb Garden, the latter a joint venture of the Arboretum and the Herb Society of America.

A native of Davidson, N.C., Dr. Cathey received his B.S. degree from North Carolina State University and his M.S. and Ph.D. degrees from Cornell University. He also studied for a year as a Fulbright Scholar at the Agricultural University in Wageningen, the Netherlands, before joining USDA as a research horticulturist in 1956.

At the Beltsville Agricultural Research Center, Dr. Cathey studied the interrelations of light, temperature, and chemicals in the growth of plants. From this research, he developed guidelines for applying light and chemicals to control the size, shape, color, pollution tolerance, and flowering of a large number of florist and nursery grown plants.

Dr. Cathey has written 22 USDA publications and has made frequent contributions to the American Horticulturist, *official publication of the American Horticultural Society. He was elected a fellow of the American Society for Horticultural Science in 1972.*

GEORGE M. DARROW: RENOWNED BERRY BREEDER

(Based upon an interview by Clay Napier, USDA, held at Dr. Darrow's home in Glenn Dale, MD)

At 92, famed strawberry breeder George M. Darrow is slow to give you the usual tips on how to grow "old." He promises to talk about that after he's had time to learn. Mention berries, though, and the native Vermonter stretches his tall lean frame nearly to his full height. That's a subject that he knows well.

"When I first went to work for the U.S. Department of Agriculture in 1911," he said with a twinkle in his eyes, "they took one look at me and figured I was too green to keep in Washington. So they shipped me off to Oregon to study the better handling of cherries and berries. Then I made similar studies with citrus fruits in Florida."

Darrow recalls that the next assignment of his 46-year USDA career involved surveying the fruit crops of Kentucky, Tennessee, and West Virginia to determine the best fruits grown there and why. For this assignment, he visited home gardeners and commercial growers who grew cherries, apples, pears, peaches, plums, strawberries, blackberries, and raspberries. From Darrow's point of view, he was broadening his education. His "teachers" lived on the sloping hills and up the hollows. What these people taught Darrow, he said, was as helpful to his scientific work as his horticulture degree from Cornell University, his Ph.D. from Johns Hopkins University, or his advanced studies in plant physiology and genetics.

From the start, Darrow recalls, he got along well with the mountain people who had grown wise in the ways of plants while propagating wild fruits. "In the Kentucky mountains, a young man with a mule met me at the train station. The mule was to carry me and my luggage," he said. "We went over a mountain and down into a valley, where I met a big man at the crossroads. It was said that when there was trouble in those parts, he administered justice. He would even go into court with people in disputes. Then he would take the people home. He settled things rightly.

"After about two years in those mountains, I was directed by the USDA to write a farmers' bulletin on each fruit. I did the most on strawberries. I told about the strong and weak points of each variety.

"I also wrote about strawberries on the Pacific coast . . . everbearing strawberries . . . all different kinds. These bulletins came out in 1918-19 and have been revised from time to time over the years."

With the advent of World War I, Darrow joined the Army in June, 1918, and went to camp in Georgia where he still found time to experiment with plants. In August, 1919, he left the Army and got married a few days later. By this time, Darrow was a recognized authority on small fruits. His writings covered raspberries, blackberries, and dewberries, currants and gooseberries.

"I surveyed cranberries that first fall after I got married," he remembers. "I had been in Oregon and Washington State. My cranberry travels also took me to Massachusetts, New Jersey, and Wisconsin, the main areas where cranberries were grown."

Then the prolific scientist began the work that was to make his name virtually synonomous with the word "strawberry." Following his military years in Georgia, he borrowed part of the greenhouse of an associate in 1919 and began breeding in quest of superior market and garden strawberries. Darrow's long and patient efforts literally bore fruit on USDA grounds--first in Glenn Dale and, later, at USDA's agricultural research center in Beltsville.

"I could take you to the spot where we picked some of our best early strawberry crosses . . . in about 1921 or 1922," he said. "It's where the Glenn Dale golf course is now. We bred bigger, better-tasting, disease-resistant strawberries there. These were especially needed by the preserving industry, which was having trouble using berries available at that time.

"One of the first crosses we ever made struck it good. It was excellent for making strawberry jam. We named it the 'Blakemore' after one of the most outstanding people in the strawberry preserving business. He was instrumental in cleaning up the industry."

"For about 30 years, the Blakemore was the leading strawberry variety in the country, mostly in the South," he said. Since surpassed in some areas by bigger-fruited types, the Blakemore still is a major variety in Arkansas and Oklahoma. As the tastes and needs for strawberries changed, Darrow and his associates originated new plants.

USDA moved its fruit research, including strawberry breeding, to Beltsville, MD, in 1932. The first strawberry plots were on heavy soil and many plants died from a disease which later was found to be widespread throughout the northern half of the United States. Darrow and his co-workers devised screening techniques for the disease, which involved growing the seedlings in a cool greenhouse in beds of wet disease-infested soil. This procedure proved very successful as a means of eliminating susceptible seedlings and became a routine part of the breeding program.

In the 1940's, the importance of virus diseases in strawberries became widely recognized. Transmitted mainly by aphids, the disease infected many plants even before they produced runners. The battle against the disease and aphids began. Under the leadership of Darrow and others, strawberry growers propagated "clean" plants, grew them in isolation, and controlled aphids by systematic spraying. The result: plants with stronger vigor and higher productivity as well as more berries at the grocery store.

Describing all of the honors that have come to Darrow for his scholarly achievements would fill many pages. Recognition has come to Darrow from high places in government and education as well as from the small fruits industry. Before he retired in 1957, former Agriculture Secretary Henry Wallace termed Darrow "one of the great strawberry experts of the world." North Carolina State University presented him with an honorary Doctor of Science degree for his contributions to agriculture in the South.

Darrow was in the first class of "Fellows of the American Society for Horticultural Science" and has been awarded the Wilder Medal, given each year by the American Pomological Society to an outstanding contributor to American fruit varieties. In recent years, the North American Blueberry Council named him a "Pioneer of American Blueberry Development." Each year, the American Society for Horticultural Science honors the author of the best paper written about small fruits culture. The honor is called the "George M. Darrow Award."

People sometimes see Darrow in different ways. When an exhibit on his work with strawberries opened at the National Agricultural Library, a friend commented that Darrow should be cited for his work with daylilies rather than for his strawberry research.

"No," said another. "Bamboo-growing is what he does best. His home in Glenn Dale is known as 'Darrow's Grove.' The first bamboo he planted came from China. Most of his bamboo grows 30 feet tall and is good for decorating a home or business, inside and out."

"Not so," said a third. "The new types of cranberries and blueberries he developed while with the USDA are the greatest."

Perhaps a more vivid image of the total man is mirrored in a dozen or so pairs of shoes in Darrow's bedroom. None are styled for black tie events. All were made for walking in the fields where food plants grow.

THE *JOY OF COOKING* CELEBRATES ITS FIFTIETH YEAR IN PRINT

Since the Joy of Cooking was first published in 1939 more than 8.5 million copies of this classic have been sold, establishing it as one of the largest selling cookbooks. The original edition, privately printed by the authors, Irma S. Rombauer and Marion Rombauer Becker, has been published by the Bobbs-Merrill Company, Inc., New York, since 1936.

First published for Mrs. Rombauer's local church in St. Louis, MO, at the urging of her daughter, Marion, and son, Edgar, Joy of Cooking was described as "an anthology of favorite recipes from someone who enjoys cooking as an avocation." According to Ethan Becker, grandson and son of the authors, respectively, "Joy has always been a family affair. My grandmother made cooking an event for the entire family and, today, our family tradition is being passed along by millions of grandmothers and mothers to their families."

Over the years the Joy of Cooking has received rave reviews from other cookbook authors. James Beard calls it "the classic work" and Craig Claiborne describes it as "the finest basic cookbook available . . . a masterpiece of clarity." Julia Child describes it as "number one on my list . . . the one book of all cookbooks in English that I would have on my shelf--if I could have but one."

Joy pioneered a revolutionary new recipe format--"The Action Method." The ingredients are printed in bold face type and interwoven, in order of use, throughout the step by step recipe procedure. The "action method" caught on quickly and was widely adopted by other cookbook authors.

Throughout its 50 years, the Joy of Cooking *has kept up with the times. The 1939 original contained only 500 recipes but devoted a major portion of them to the economical use of leftovers in response to homemaking problems caused by the Depression. The 1943 edition included recipes for the "war bride." In 1946,* Joy *reflected a return to abundance with new material on marketing and nutritional values. For the 1951 edition Marion Becker expanded the book's commitment to classic continental cuisine and what she describes as "ingredients which modern science and modern transport have made so miraculously available."*

Today, Ethan and his brother, Mark, are planning the further development of the Joy of Cooking. *They research and test new recipes and follow their grandmother's cardinal rule, created 50 years ago, "to write as though all users are amateurs in the kitchen." According to Ethan, "The palates of family and friends have always been the arbitor in selecting the thousands of recipes incorporated in* Joy *over the past 50 years."*

The tradition of the Joy of Cooking *has also been enriched by its readers through their letters, suggestions, and praise as reflected in these instances:*

* *The commander of the aircraft carrier* U.S.S. Enterprise *commended* Joy *for keeping up the morale of American pilots throughout World War II;*

* *An inexperienced cook in a South American mining camp credited the* Joy of Cooking *with saving his life since the miners had a reputation for physically abusing the cook if the food wasn't good;*

* *A Cleveland man, who corresponded with Marion Becker for years, cooked his way through the entire* Joy *during his retirement.*

Irma Rombauer felt one of the finest testaments to the Joy of Cooking *came in a telegram from an eloping bride to her family: "Am married--order announcements--send me a Rombauer cookbook at once!"*

Irma S. Rombauer (l) and Marion Rombauer Becker (r), authors of Joy of Cooking *(Courtesy, Harshe-Rotman & Druck, Inc., Public Relations, for The Bobbs-Merrill Company, Inc.)*

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